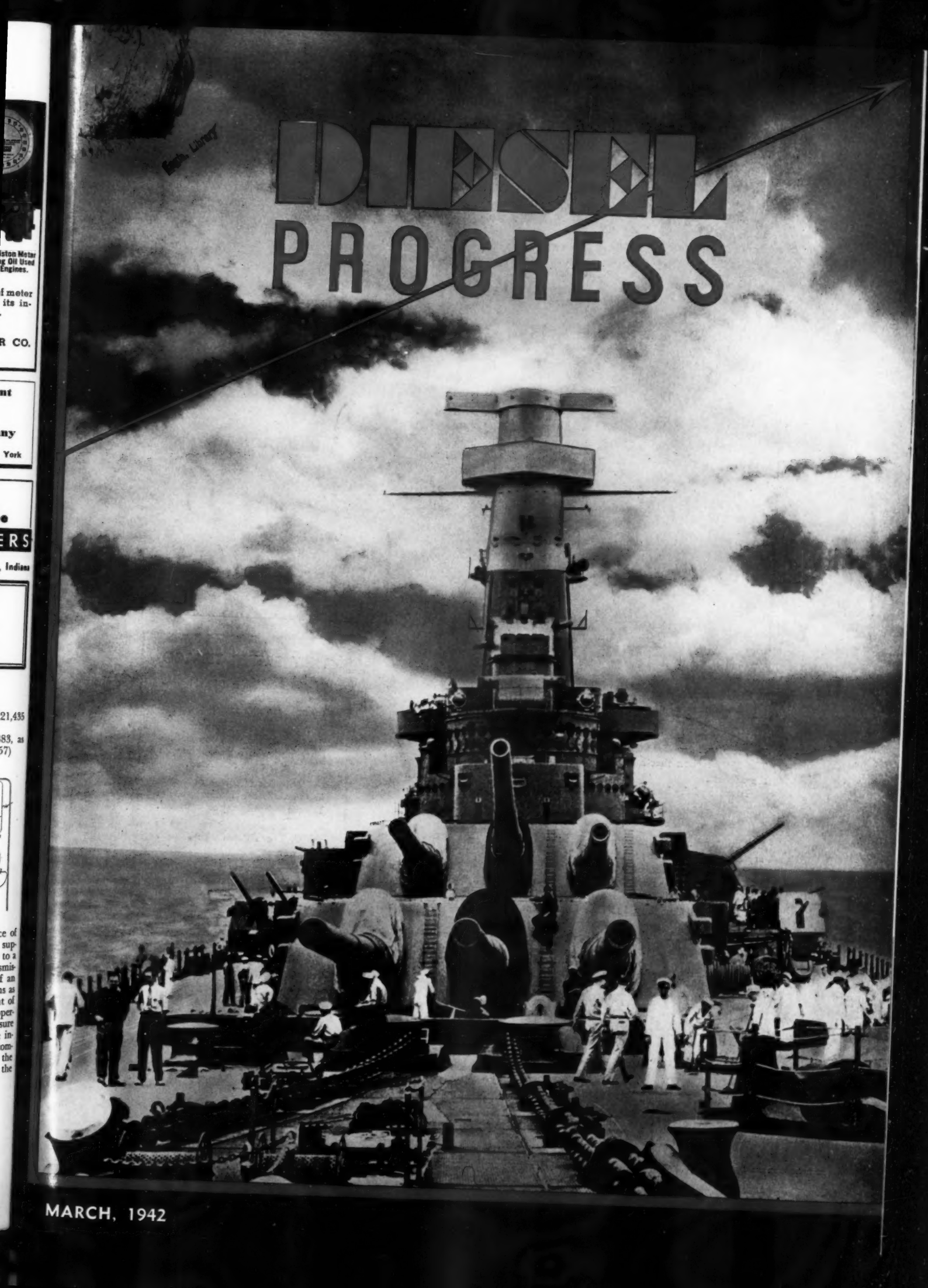
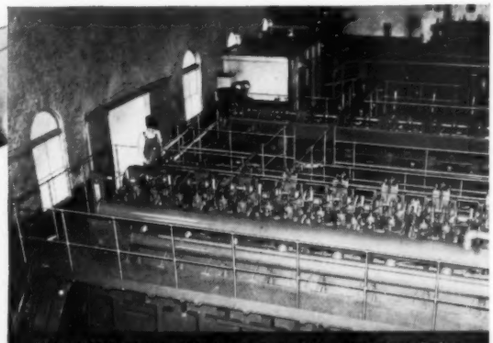


MARCH, 1942

Every Ring Operating Freely



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DIESEL and GAS ENGINE PROGRESS

REX W. WADMAN
Editor and Publisher

FRONT PAGE ILLUSTRATION: Official U. S. Navy Photograph.

TABLE OF CONTENTS ILLUSTRATION: Diamond T Motor Car Co. of Chicago is building 835 vehicles, like the one shown here, for tank transport in the British Army. Claimed by its builders to be the largest unit of its type ever built, this six-wheel tractor is designed for 160,000 train load and is powered with a Hercules six cylinder Diesel of [illegible] cu. in. displacement, developing 200 hp at 1600 rpm. Size of this giant may be visualized from the following: Fenders [illegible] wide; Engine weighs more than [illegible] ton truck; Hood almost 8' long and [illegible] higher than an automobile.

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HEYWOOD H. CAMPBELL
Art Director

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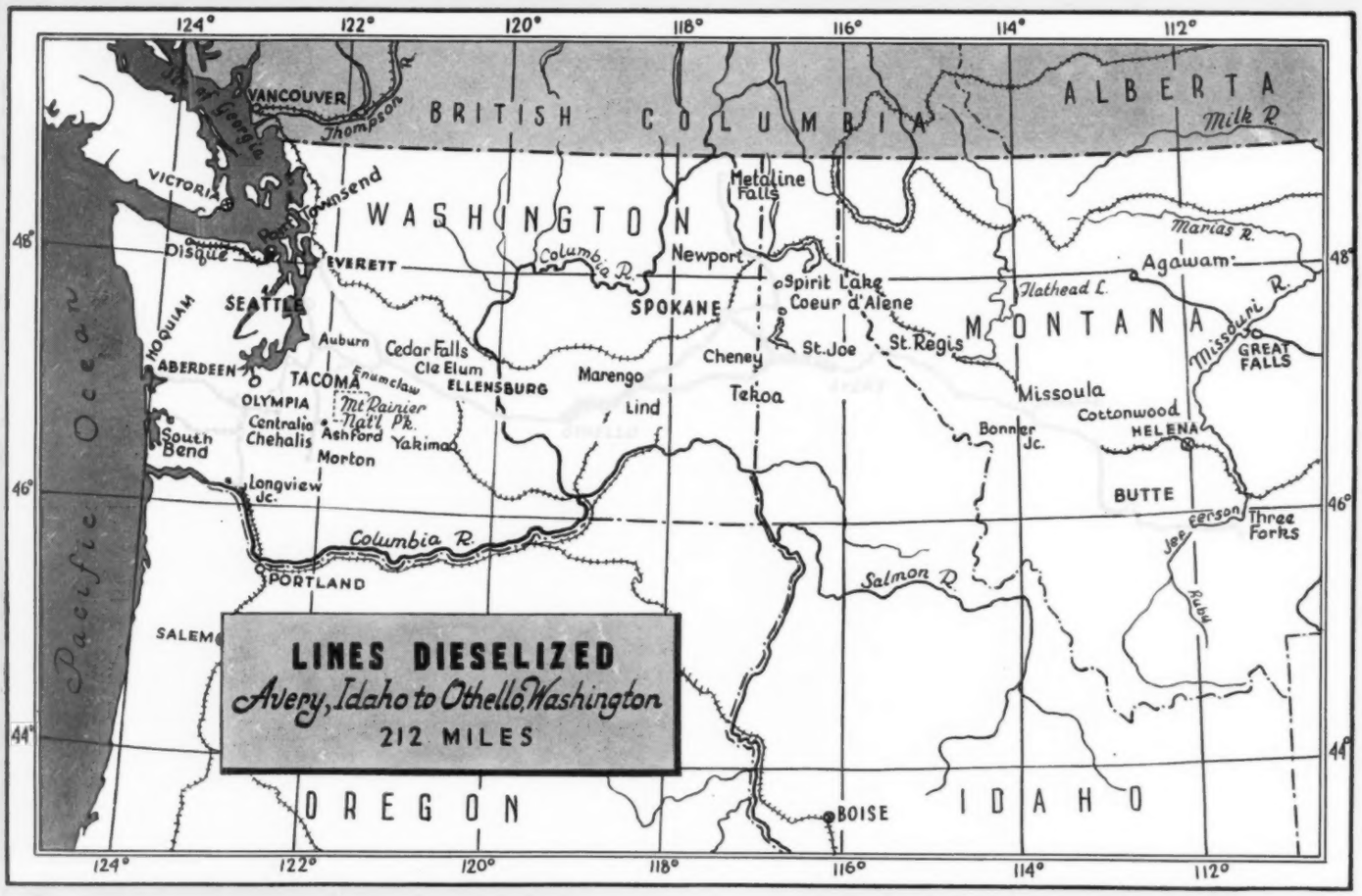


DIESELS BRIDGE THE GAP

By CHAS. F. A. MANN

ANOTHER piece of world railroad history was made in November by the Chicago, Milwaukee, St. Paul & Pacific Railroad, pioneer electrified transcontinental system that loves to pioneer practically everything, including motive power, speed, passenger luxury, and mechanical gadgets of every description. The Milwaukee, in its long years of railroad pioneering, also helped pioneer another milestone for Diesel railroad power. This time, on November 6, it became the world's first electric railroad to bridge the gap between its two main electrified sections with Diesel equipment for mainline haul. At that date the first of possibly four 5,400 hp. General Motors Diesel freight-passenger type locomotives began a series of test runs between Avery, Idaho, western end of the Montana electrified zone, and Othello, Washington, Eastern end of the coast electrification, on the 212 mile gap through rolling hills, deep valleys and the famed Palouse wheat country of Washington State.

Electric locomotives bring 3500 ton freight trains westbound into Avery, and, because of increasing speed demands on through freight.

it is often necessary to reduce the trains to 1500 or 2300 tons in order for the steam Mallet type locomotives to get them across to Marengo, Washington, to make connections with the Union Pacific on Portland, Oregon, freight. Westbound, the giant electrics bring 5000 tons over the Cascades to Othello, in the Columbia Basin desert, just east of the Columbia River. It is necessary to reduce the tonnage to 4000 tons for the Mallet steam locomotives eastbound to Avery, thus causing delays on important heavy tonnage trains bound from Puget Sound to Chicago.

For twenty-five years this has been a problem. Electrification of this segment has been impractical because the Milwaukee divides between Plummer Junction, Idaho and Marengo, Washington, into two separate lines, one going via Spokane to the north over a route on which part is leased trackage from another system, and the other a direct, shorter and very fast line across the wheatfields to the south of Spokane, generally used for freight trains. To electrify one of these routes would be uneconomic and to electrify both would be financially unsound because of division of traffic and divided ownership of trackage. Now comes the Diesel Age on railroads with a perfect solution. Diesel electrics can haul the same tonnage, at FASTER speeds over EITHER route, than the Coast and Montana electrified zones will either bring in or take away at the junctions.

It costs $100,000 per mile to electrify a railroad for 3,000 volt D.C. current, the only system that will permit the use of that marvellous regenerative braking system that permits downhill haul of a 5,000 ton freight train without a single airbrake application. Track substations have to be built every eighteen or thirty miles.

Dieselization of a system handling the Milwaukee's average traffic costs only $25,000 per mile including changeover of shop facilities with a few switch engines thrown in. The answer is obvious, especially when General Motors Corporation has borrowed the Milwaukee's regenerative braking system and with a little re-designing, to dissipate the downhill-generated electricity, has created Diesel freight locomotives with full regenerative braking, one perfect solution to ALL freight train operation. To the Diesel engine fraternity, the Milwaukee's contribution was no less than magnificent, for it really spells the end to further electrification on the part of the pioneer American line in that field, and the acceptance of Diesel-electric motive power as the economical, flexible and highly dependable successor to what has been the most efficient electrified system in the world. Switzerland and Italy not excepted.

To the railroad industry, the advent of Diesel locomotives of large power into a field that was, until just two years ago, the most likely for further expansion of electrification on a very large scale, is more than a piece of mechanical significance, for it at once makes the entire Milwaukee system, from the Great Lakes to Puget Sound, a veritable laboratory of motive power, and it is the green light on expansion of heavy transcontinental freight and passenger movement with Diesel-electric locomotives on a huge scale. The Milwaukee has every known type of power ever designed for American railroads—all classes of simple steam; articulated mallets; coal fired high speed and low speed freight and passenger steamers; three distinct classes of giant and very fast electric power; oil-fired steam locomotives of all types; the two principal types of Diesel switchers, and now both giant Diesel freight and passenger locomotives. Everything under one watchful eye for a full test to the bitter end of all types. And the Milwaukee pioneered those 1,000 mile continuous runs with fast steam power, too.

Railroaders admit on all fronts that Dieselizing of a 212 mile gap in its Western electri-

The Milwaukee's new 5,400 hp. General Motors freight-passenger locomotive.

Engineer Lee Thorne on the first eastbound trip of the new Diesel locomotive.

One of the four, 16 cylinder Diesels in the four-unit General Motors 5,400 hp. locomotive.

fication means that the economics of Diesel motive power in rugged mountain territory have triumphed over steam and electrification; steam because of mechanical limitation, and electrification because of its terrific capital outlay. In short, Diesel locomotives are an economic as well as a mechanical success, a vital factor in breaking down 100 years of tradition-bound railroad practices.

If the Milwaukee's Othello-Avery Dieselization is a success, the next step will be from Harlowton to St. Paul on the other end, and it spells the end to further electrification by the pioneer American line, which even now, is the longest electrified line in the world, straightaway distances considered.

The new Milwaukee Diesel is almost exactly like the original General Motors test Diesel freighter, of which the Sante Fe now has four and fifteen more on order. The writer described this type fully in two Spring, 1941, issues of DIESEL PROGRESS, after a transcontinental trip aboard No. 2 General Motors Diesel freight locomotive.

Not only did the Milwaukee specify the four-unit, 5,400 hp. type, with a 16 cylinder V type General Motors Diesel generator set in each of the four units, but the fully developed General Motors regenerative or dynamic brake, as they quaintly call it, has been installed and even this has some improvements.

The dynamic brake system, which simply reverses the traction motors and dissipates the waste electricity on a downhill run into heavy grids or heaters, air-blast cooled, mounted in the roofs of the four cab sections, has one improvement well-liked by the railroaders. That is the inclusion of an extra position on the brake control switchbox to permit cutting in the brake without stopping the train. General Motors test crews and research men are already at work on a scheme to excite separately the traction motors during braking to increase flexibility and raise the braking or retarding power to the same foot-pound capacity as the locomotive has when motoring uphill at any given speed. As it is now, the dynamic brake will only retard about 60% of the load it can pull uphill at any given speed.

The Milwaukee Diesel has another feature which brings it into the well-nigh perfect class. Already designed for speeds up to 70 mph., this new Diesel has two large size, fully automatic vapor heating boilers for heating passenger trains. This pair of boilers, located in the two middle cab sections, permits use of the locomotive on heavy passenger runs at sustained high speeds greater than now permissible over this same territory. It can haul a freight train one way and a passenger train the other.

Reduced to practical prognostication for the immediate future, if the Milwaukee installs three of these four-unit, 5,400 hp. Diesels, equipped with dual heating boilers, dynamic braking and fuel capacity for 600 miles running, it will be possible to haul one daily round trip of a passenger train between Othello and Avery, via the Spokane line, and two daily round trips of fast through freight between Othello and Avery via the freight line. In emergencies each of the three Diesels can make a ROUND TRIP AND A HALF *EACH*, during troop train movements, extra sections of regular trains and special movements of various kinds or second sections of passenger trains during the summer tourist season. This amazing performance of three locomotives so equipped, will replace ten steam locomotives, a forward stride in railroad operation almost unbelievable.

The Milwaukee's new Diesel freighter is the now standard type of General Motors four-unit Diesel, with fully automatic controls and elaborate alarm system, each of the units mounted on two four-wheel trucks with roller bearing journals, automatic sanders and identical operating cabs at either end, eliminating the necessity for turning. The usual heaters, windshield wipers, dual horns, warning bell mounted at track level instead of high up; sun visors, safety glass in the cab, and fully automatic dynamic braking system—automatic except for the engineer's control buttons; wheel slipping indicators, engine alarm system and radiator water control and alarm systems make for safe, smooth operation.

The locomotive is 193 ft. long and a total weight of 856,000 lbs. and has a fuel capacity of 4,800 gallons, 1,200 gallons per unit, or enough to operate over 600 miles at full load, with consumption based on seven gallons per mile for the Diesels and one gallon per mile for the heating boilers at full load. With a weight to just over 26½ tons per axle, the load is scarcely about 26,500 lbs. per wheel, far below the average maximum wheel load of a steam locomotive.

The flexibility, economy and high daily operating period possible, will more than offset the $500,000 cost. Again, when costs are figured, the investment outlay has little to do with it.

The old steam Mallets—"Sows" to the Milwaukee crews—can run but one trip per day across the Gap. The Diesels make three and do it with more tonnage.

Eastbound out of Plummer junction, the Diesel, on its first eastbound trip, hauled 4670 tons down the 1% grade at an even 25 miles per hour. Westbound, that same night, the Diesel had 2482 tons in 67 loads and empties, and hauled it *up* that same 12 miles of 1% grade at an average speed of 30 miles per hour. *Twenty-Seven Minutes* for 2482 tons, while the night before November 5, one of the puffing old "Sows" hauled 2200 tons up the same hill in one hour and ten minutes!

From Avery to Marengo, the first night of a regular Westbound trip, the Diesel hauled that 67 car train ONE HOUR FASTER THAN THE WESTBOUND OLYMPIAN was scheduled over the run. But, of course, the Milwaukee officials smiled and said the Olympian had to stop 30 minutes in Spokane! Nobody pressed for an answer as to what became of the other 30 minutes!

The Huntington plant of the Long Island Ice Corporation.

TWIN ICE PLANT DIESELS SET 75,000 HOUR RECORD

By WM. H. GOTTLIEB

THE two key plants of the Long Island Ice Corp. system have been in operation 75,000 hours in less than eleven years and have set impressive records of Diesel economy and durability. Though the Huntington, L. I., plant is rated at 90 tons and the Smithtown, L. I., plant at 85 tons, the main power units are identical De La Vergne Diesels rated at 320 hp. at the slow speed of 220 rpm. These engines have been in operation 24 hours a day, 300 days a year, for more than ten years, without a single forced shutdown. The original pistons, cylinder liners, bearings, inlet valves, and exhaust valves are still in service. One set of piston rings and a few bypass valves and bushings constitute the full list of repair parts purchased for these plants. In the past two years, the total annual cost of repair parts for each of these veteran engines has been just $6.50. The total cost for the entire life of the two plants is $337.33, which figures less than 5 cents per hp. per year.

The exceptional performance economy achieved by the Long Island Ice Corp. is the direct result of intelligent, long-range planning. In setting up these plants in 1931, Chester J. Conn, Vice-President and Chief Engineer of the company, had two primary objectives: the lowest possible operating costs, and maximum dependability in long service. To attain these ends, he put up sturdy buildings and installed slow-speed, heavy-duty equipment. The plants are designed so that one man can handle both the power and the ice machinery. Unusual 23-can lifts enable the operator to pull large quantities of ice easily and without loss of time. The power units are of a type that require very little superintendence.

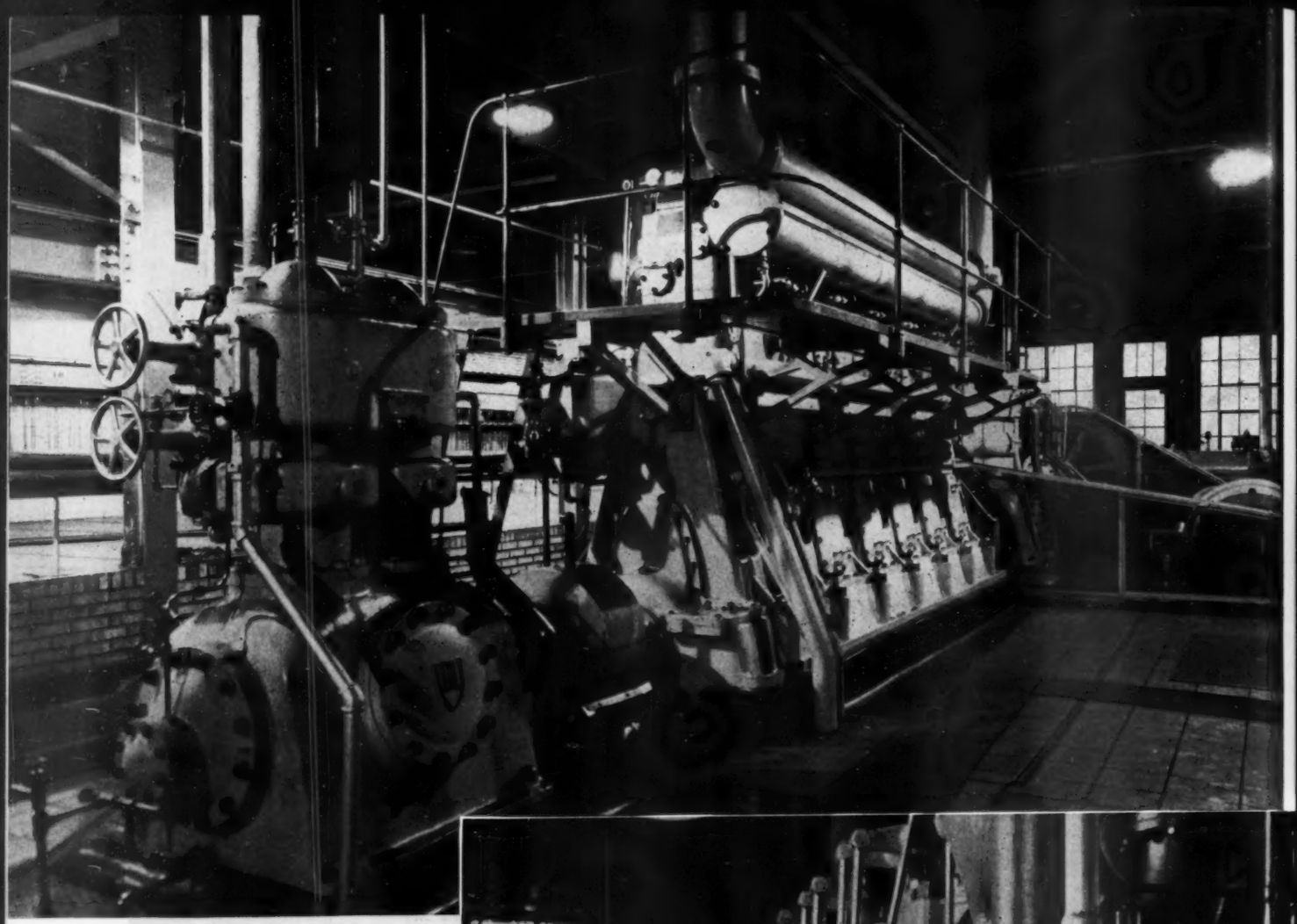
The company plan called for a substantial reserve of power capacity, for it is the conviction of these engineers that maximum, long-range economy can best be achieved with a steady load factor of 65 percent. The Model VG De La Vergne Diesels are 6-cylinder units of 14½ in. bore and 18 in. stroke and are capable of developing 450 hp. at 300 rpm. In these plants, they are operated at 220 rpm. with a rating of 320 hp. at this speed. The company's system of seven plants is so managed that Huntington and Smithtown can operate on the 24 hour, 300 day schedule with the desired load factor. At the close of the normal summer peak period, there is a large demand for ice to refrigerate cars for shipment of cauliflower. The Long Island Duck Packing Corp., a subsidiary of Long Island Ice, and a pioneer in the quick freezing and shipping of ducks, also demands power at this time.

In the interest of efficient power transmission, the ammonia compressors are direct-connected to the Diesels, but it was found possible to make this arrangement highly flexible. The main engines are designed to permit power take-off at both ends of the crankshaft and so, each unit drives two compressors, an 11 in. x 13 in. machine at one end and a 10 in. x 10 in. compressor at the other. These are slow-speed machines and operate with maximum efficiency at 220 rpm. The compressors are driven through flexible, laminated couplings, and it is a simple matter for the operator to disconnect a compressor from the engine. Thus, the Diesel can drive either or both of the compressors, providing the convenient element of flexibility. In practice, both units are usually in service together. Each plant also has a lighting load and a motor load for such equipment as blowers and agitators and hoists. Electric power is supplied by a generator belted to the main engine flywheel. The Ideal Electric generators are rated at 60 kw., 75 kva. and produce three phase, 60 cycle, 230 volt current at a generator speed of 900 rpm. The exciters are direct-connected.

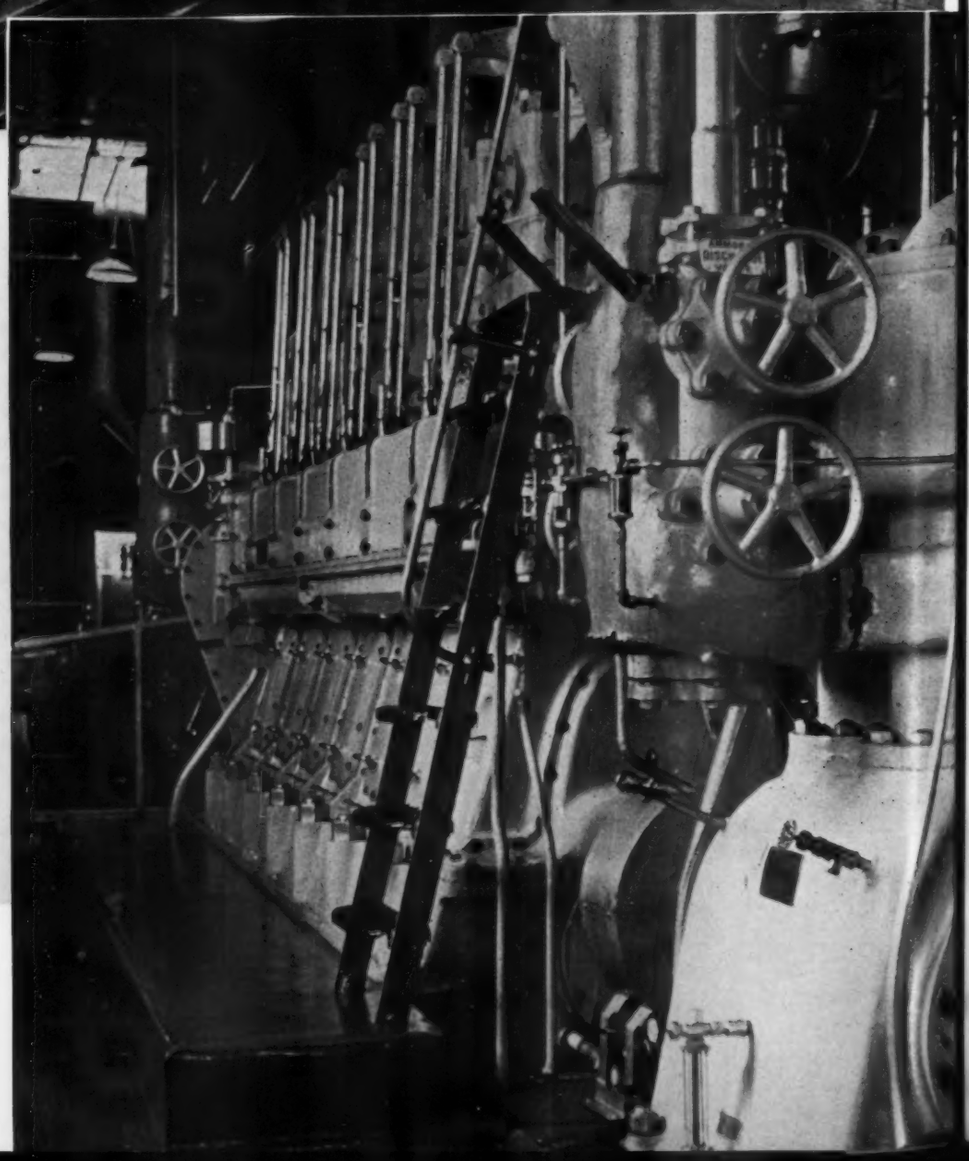
In addition to the main engine, each plant contains an auxiliary Diesel which operates when the big unit is shut down. The function of the auxiliary is to carry the lighting and motor loads and to keep the temperature of brine and the storage room down. At Huntington, a single-cylinder, 65 hp., horizontal, De La Vergne Diesel drives directly a 7 x 7 De La Vergne compressor and, through belts, a 35 kw. Ideal Electric generator. At Smithtown, a 50 hp., one-cylinder Ingersoll-Rand Diesel is direct-connected to a 7½ x 14, single-acting, IR compressor with a 25 kw. Ideal generator belted to the engine flywheel.

We have seen how plant and equipment design kept down the labor and repair costs. Comparable results have been achieved with respect to fuel and lubricating oil. Tests have shown that economy has been maintained effectively through the years. Fuel consumption is calculated to be .41 pounds per b.hp.-hr. The fuel systems in the two plants are practically identical and are designed for economy, safety and ease of operation.

Lubricating oil consumption is only about forty gallons a month, which is better than 5,000 hp.hrs. per gallon. The oil is circulated from an elevated tank through the engine at 9 pounds pressure by a gear pump driven off the crankshaft. There is a strainer in the sump tank and a duplex filter on the discharge side of the pump. The cylinders are lubricated



View of the Huntington engine room showing the main De La Vergne Diesel and compressors. The De La Vergne auxiliary Diesel is seen in the background.



The De La Vergne Diesel and one of the two compressors in the Smithtown, Long Island, plant.

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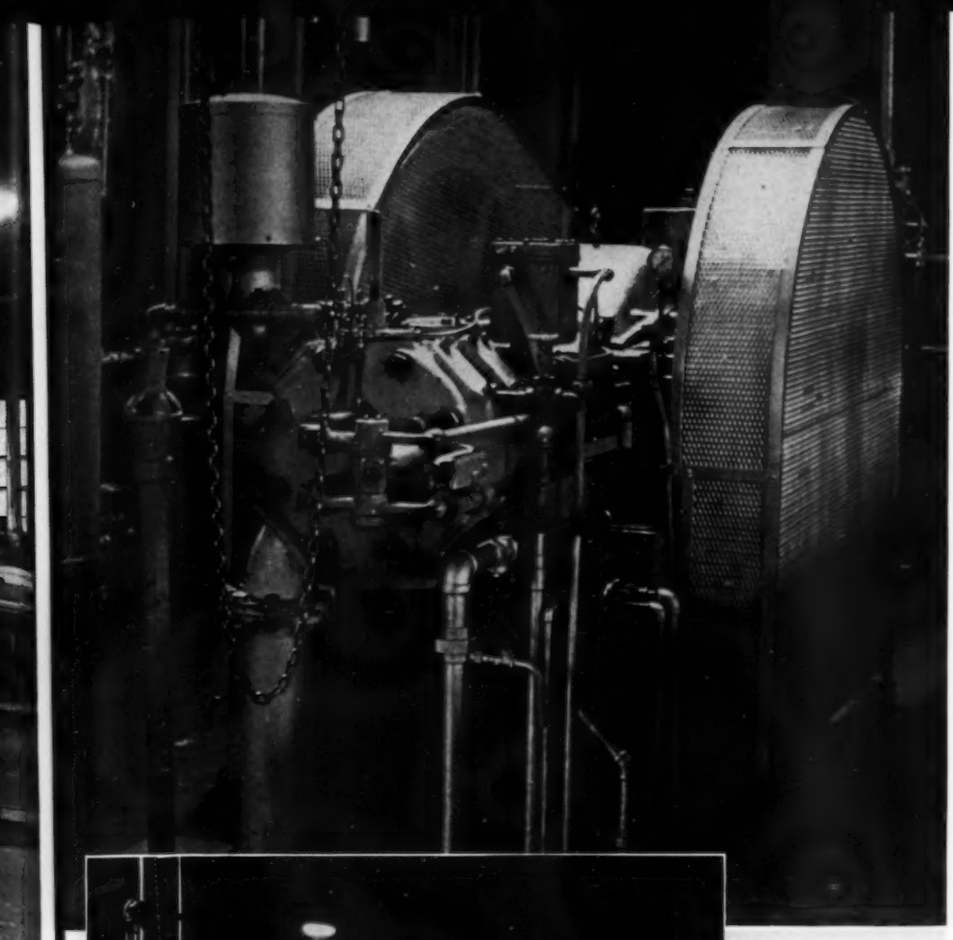

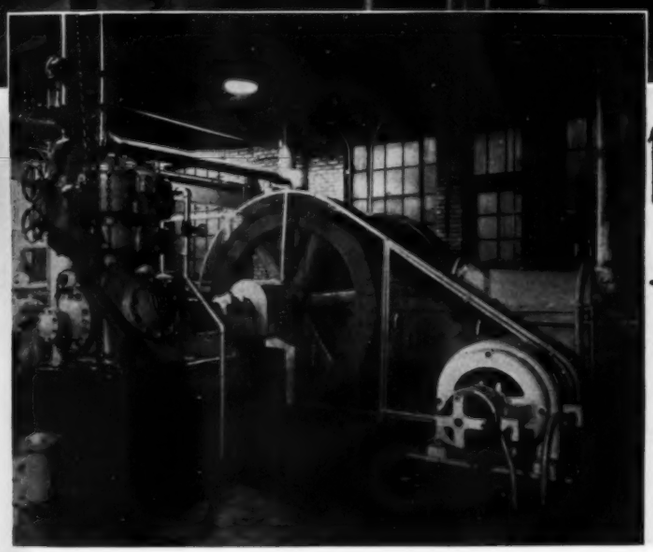

The De La Vergne horizontal auxiliary Diesel in the Smithtown plant.

This auxiliary unit at Huntington consists of De La Vergne Diesel and direct connected compressor, and a belt-driven Ideal generator.

adequately by the oil fog in the crankcase. The efficacy of lubrication is evidenced by the extremely small amount of cylinder liner wear. Average liner wear per thousand hours is well under .0004". Lubricating oil is never discarded but, periodically, batches are taken from the sump tank and reclaimed by the coagulation method.

Both plants are fortunate in having good wells on their property with water soft enough to eliminate the problem of scale formation in the engine cooling system. Motor-driven well pumps (a three stage turbine at Smithtown and a centrifugal at Huntington) deliver water to the condensers at about 52 degrees. Leaving the condensers at 65 degrees, the water flows to the engine jackets and finally to waste at 100 degrees. The systems are connected to the city water supply for emergency protection. At both locations, the plants are close to business and residential districts and the elimination of noise is essential. Horizontal silencers on the roof muffle intake air and exhaust.

Since superintendence was to be held to a minimum, it was felt necessary to lighten the operator's work as much as possible and to provide automatic safety devices to function in his absence. A multi-point exhaust pyrometer, dial-type thermometers, and pressure gauges are arranged conveniently so that the operator can check plant conditions quickly and easily. An alarm sounds if the well pump stops, if the lubricating oil pressure drops below a predetermined point, if lube oil level in the sump tank drops too low, if the pressure rises too high in the ammonia system, or if the agitator or air blower stops. In each case a red light goes on to show the cause of trouble. If lube pressure drops below three pounds, the fuel is cut off automatically, stopping the engine. The engine is stopped in a similar manner if the alarm on high ammonia pressure is ignored. In case of overspeed, a separate stop holds the exhaust valves open. It is evident that the company's valuable machinery does not go unprotected, whether or not the operator is in the engine room.

Once a year, during the slack season, each main engine is given a thorough inspection. Micrometer readings are taken to check on piston and liner wear. The alignment of pistons, rods and crankshafts are checked carefully. This thorough servicing undoubtedly has been a factor in the performance record of the plants. Long Island Ice Corp. officials feel that their inital investment and their painstaking operating plan have paid ample dividends in the past decade. Every item of operating cost has been low and not once in 75,000 hours of service have the Diesels failed to deliver the required power. The success of one plant might be a happy accident, but identical results in Huntington and Smithtown are evidence that the equipment and the operating system were well planned.

The main Diesels and compressors are De La Vergne, as are the Huntington auxiliary engine and compressor. The auxiliary unit at Smithtown is an Ingersoll-Rand. All generators are Ideal; the Ideal switchboards have Weston instruments. The lube oil is Shell Talpa 241, the reclaimers De La Vergne, the lube circulating pumps and coolers Schutte & Koerting. The fuel is Tidewater, the transfer pumps Browne & Sharp, the meter a Neptune Trident, the day tank level gauges Rochester, the cooling water pumps Sterling. Flexible couplings are Francke, belts Mulhern stretchless, silencers De La Vergne, piston rings Double Seal. The thermometers are Motoco, the pressure gauges Ashcroft, the exhaust pyrometers Alnor and Brown, the safety engine stop a Fulton Sylphon, the overspeed stop Strong, alarms Mercoid.

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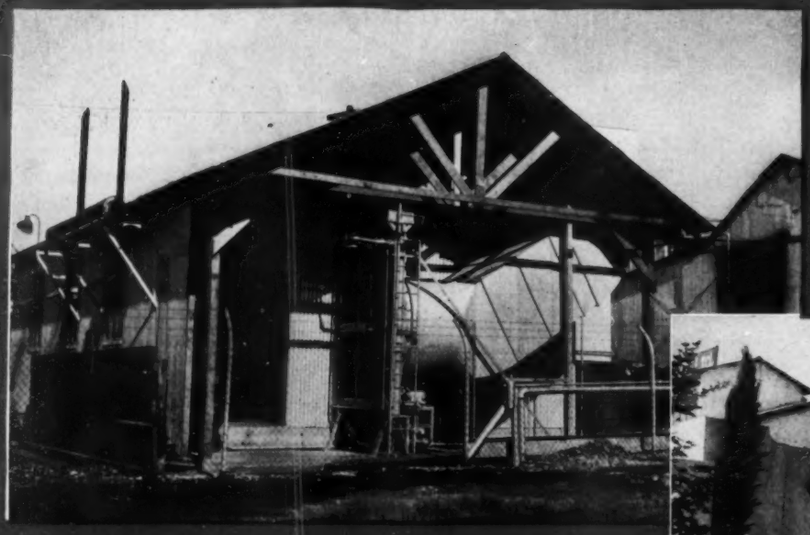
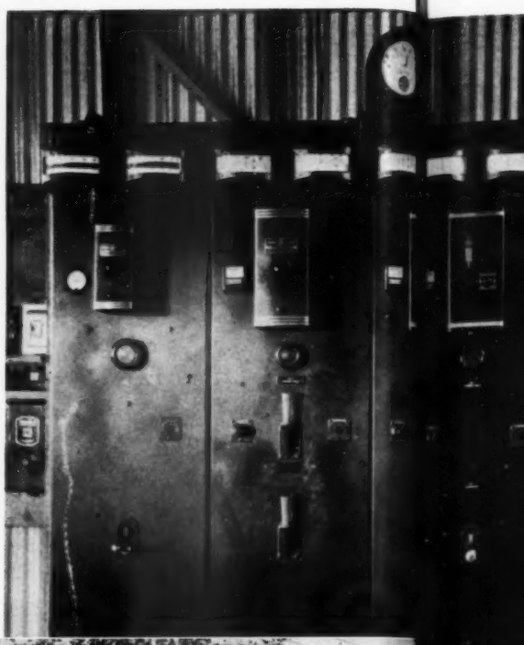
DIESELS CUT POWER COST $150 A MONTH

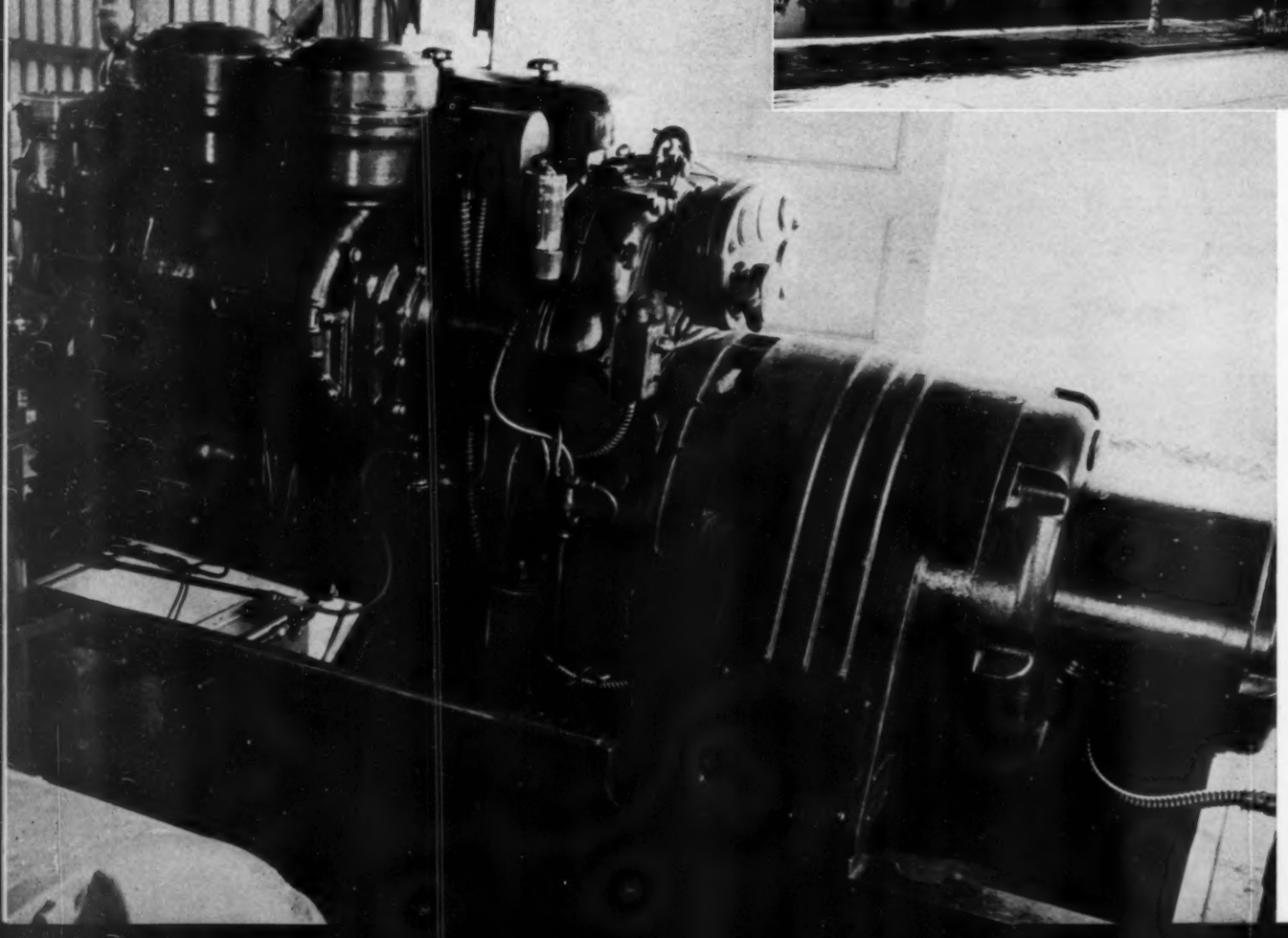
By JIM MEDFORD

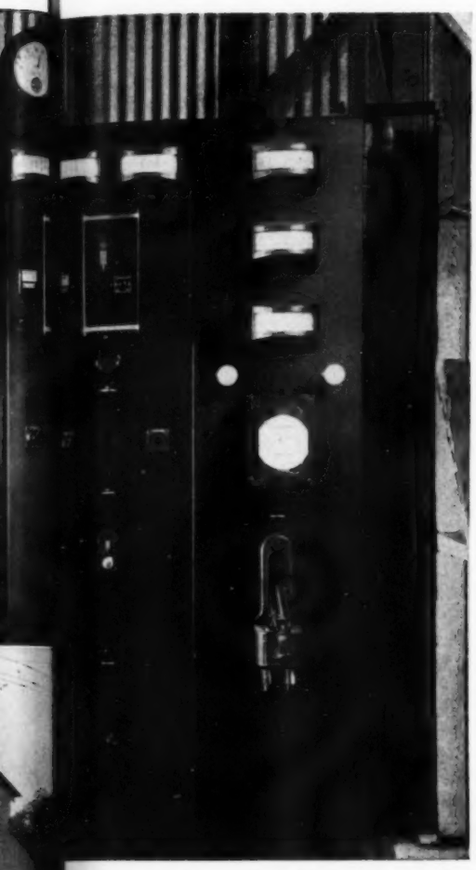




Above: Rear view of engine house showing radiator cooling system and muffler exhaust silencers. Below: Close-up of the General Motors Diesel and G.E. Generator.

Above: T ing two G kesha gas

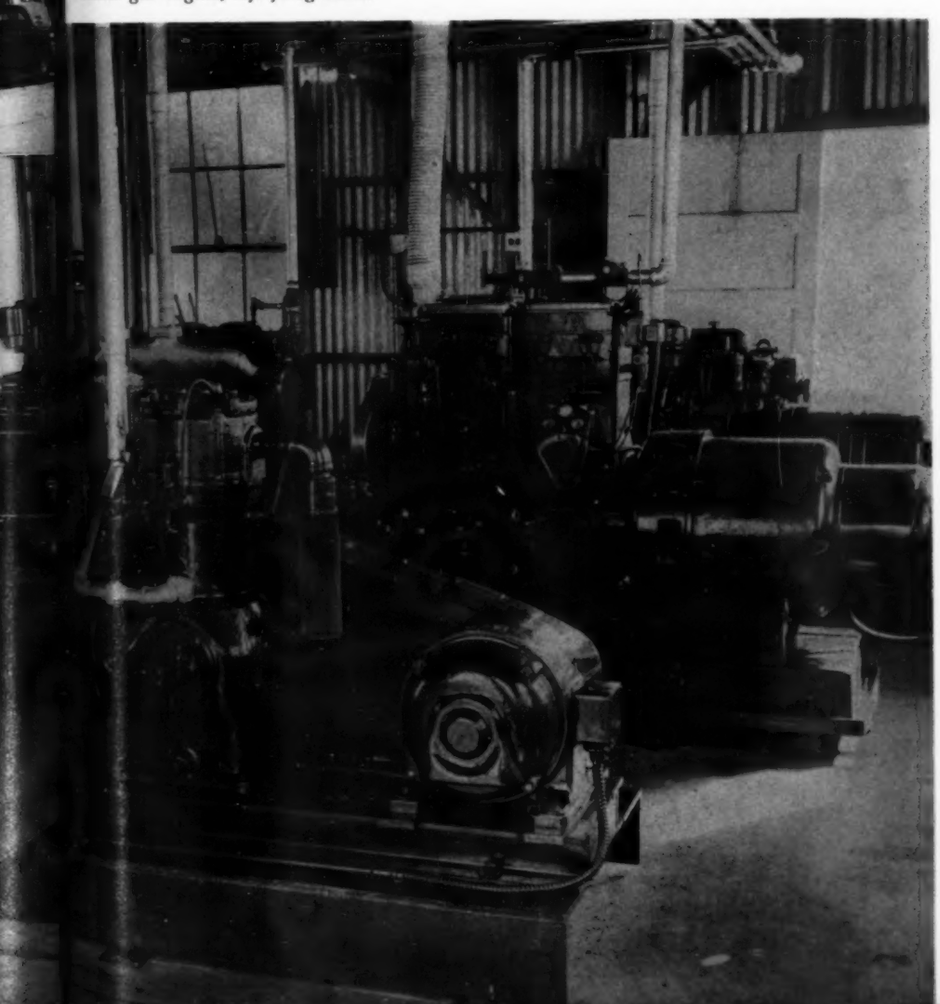




WHITTIER, California, located in one of the finest citrus areas of the Southland, is not generally looked upon as a manufacturing city. But now and then a company with a yen for elbow room, and an eye to the lower real estate prices, moves in and begins to turn out its products. One factor that always faces a manufacturer, no matter where he is located, is that of power cost—always an expensive item in production overhead. Not only is the cost to be carefully considered, but even more important is the question of dependability.

Crum-Brainard Co., Ltd., manufacturers of a popular line of rotary oil well drilling bits, carefully considered this power problem some time back with the result that President Roland Crum decided on the installation of a pair of General Motors 6 cylinder, 4¼" x 5" Diesels rated 90 hp. at 1,200 rpm., direct coupled to General Electric 60 cycle, 60 kw. generators with exciters mounted on the shaft extension. These two engines, after fifteen months of experimental operation proved their dependability and economical value to such an extent that it was decided to add two more Diesel units, but unfortunately it was impossible for G.M. to make satisfactory delivery. The engines selected were a Cummins 4 cycle, 4 cylinder 4⅞" x 6" Diesel rated 38 hp. at 1,200 rpm. direct connected to a 60 cycle, 30 kw. G.E. generator and exciter; and a Waukesha 4 cycle, 6 cylinder, 4" x 4¾" gas engine multiple V-belted to a 60 cycle, 60 kw. Master Electric generator and exciter, for supplementary and standby service.

Above: The General Electric switchboard. Note G.E. Synchroscope, top. Below: View showing two General Motors Diesels, background; Cummins Diesel, right foreground; and Waukesha gas engine, left foreground.



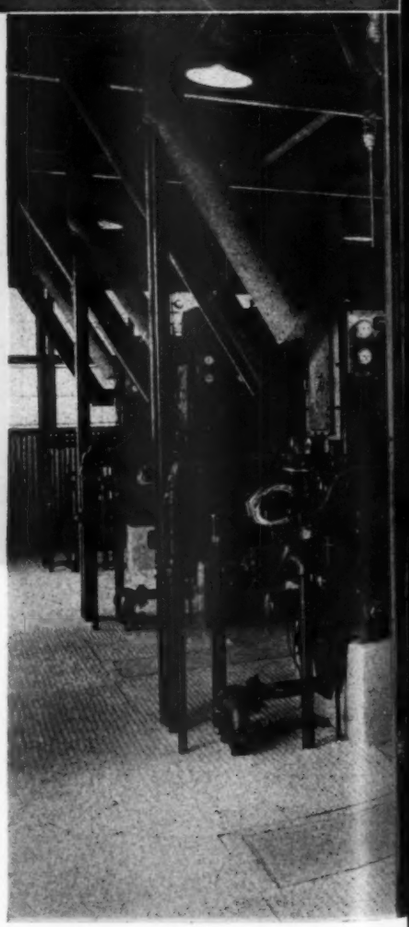
A new cooling system for engine circulating water was installed at one end of engine house taking the place of the original cooling tower. This consists of a 5' by 8' radiator and 52" fan powered with a two speed motor, 2½-5 hp., turning 440-510 rpm. holding temperature not to exceed 175 degrees under thermostatic control. Valves are so located in water lines that should anything go wrong with the radiator, water may be circulated direct from supply to overflow into sewer. Engines take water direct from common manifold and discharge through individual lines to radiator. Fuel oil supply is received direct from tank car on the factory spur by gravity to a 10,000 gal. underground storage tank. A transfer pump handles the oil through filter to 75 gal. day tank outside the engine house.

An outstanding feature of this plant, and a definite test of the power source, is the constant varying load throughout the average sixteen-hour day. In addition to the 72 individual motors ranging up to 30 hp. driving the various machine tools using a total of 375 hp., there are six heavy duty electric welding sets, individually operated, giving the load a wide range of instantaneous on and off demand, as high as 50% of rated capacity. According to operating figures supplied by the plant management, the total annual output of the generating plant is 420,000 kwh., at a cost of one cent per kwh, giving a yearly saving of $1,800, or an average of $150 monthly, something the average industrial plant cannot afford to overlook.

Interesting equipment items other than those mentioned in text include: starting motors by Delco-Remy and Leece-Neville; governor by Woodward; air compressor and motor by Chicago Pneumatic and Sterling; fuel oil transfer pump by Viking; lube oil filters by P-E, De-Luxe, Skinner; thermo switches by Mercoid; Tungar battery chargers; lube oil gauges by AC, Weston, Marshallton; air filters by AC, Donaldson, Vortox; exhaust silencers by Maxim; Cummins Diesels mounted on Korfund Vibro Isolators; batteries by Eveready; engines cooled by Modine radiator system; cooling water pumps by Worthington; cooling system thermo control valves by Fulton, Cummins and Mercoid.

The four Superior gas engines and Westinghouse generators, with switchboard at extreme right.

View showing control end of the four main engines. →

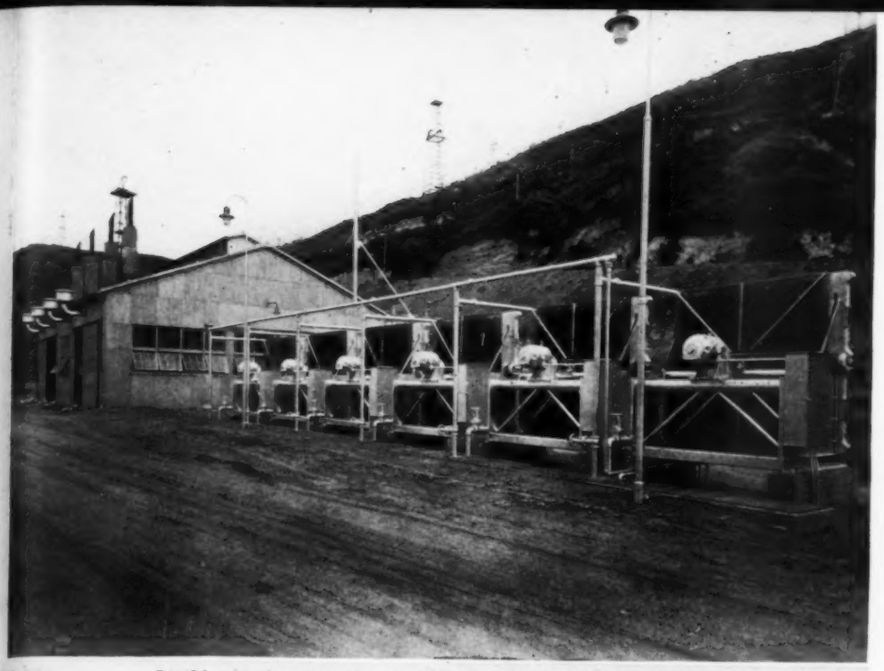


GAS ENGINES POWER RINCON OIL FIELD

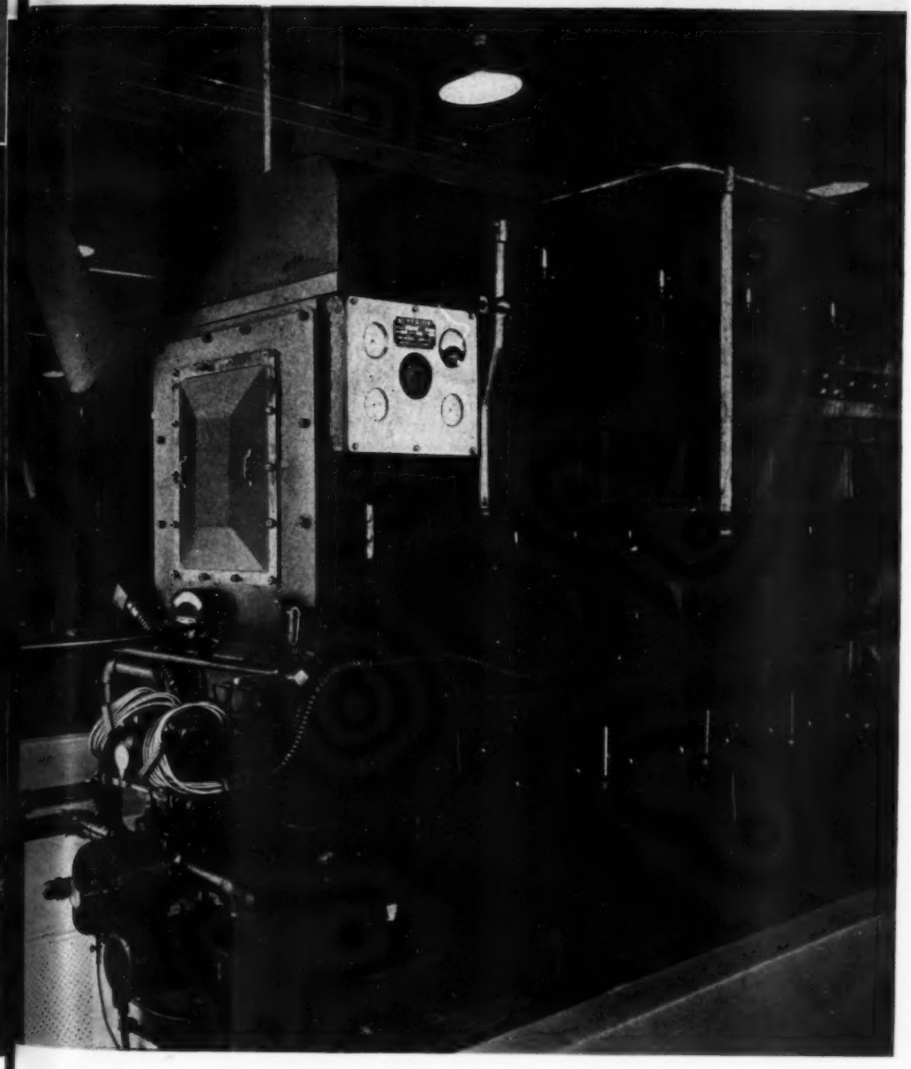
By JIM MEDFORD

LOW cost field operation and assurance of plenty of power, in case of a shortage due to expansion of defense industries or other causes, were important factors in the selection of the recently installed convertible gas-Diesel electric generating units by the Chanslor-Canfield Midway Oil Company for development of its Rincon properties, Ventura county, California. Pioneers in the application of electric energy to rotary drilling and pumping, Chanslor-Canfield, in selecting the engines, gave first consideration to low maintenance cost, plus long, trouble free service regardless of higher initial investment. The result is a modern compact plant that is a credit to the company whose engineers designed and installed the generating units and all accessories.

Current is generated at 2,400 volts by four generators, each with a multiple belt driven exciter. These 60 cycle alternators rate 400 kw. at 80 percent power factor and are direct connected to a like number of 8 cylinder, 12½" bore and 16½" stroke, convertible gas-



In this exterior view are seen Air-Maze intake air filter-silencers, Maxim exhaust silencers and Young Radiator cooling system.



Diesel engines rated 580 hp. at 400 rpm. Fuel is natural gas from the field, eliminating transportation and storage. Installation of this type of power during the field development stage means lower operating cost during the higher productive stage and permits operation of the field long after cost of purchased power would prohibit same.

Underground conduits carry current to the switchboard, then by copper tubing to the distribution rack with its transformers where a portion of the current is stepped up to 16,500 volts for distribution over circuits to drilling operations. Capacitors or static condensers are installed throughout the field to raise the power factor from approximately 60 percent to 82 percent necessary to make the total generator capacity available at field locations.

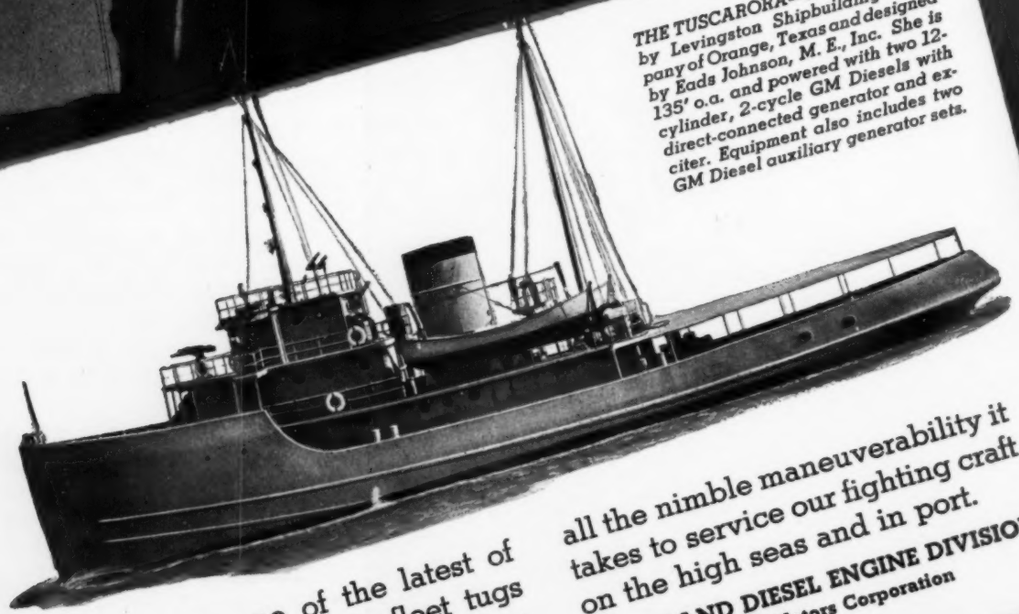
Other transformers at the plant step down the 2,400 voltage to 440 volts for cooling fan operation, and to 120 volts for lighting circuits. Disconnects and oil switches are provided to isolate lines in case of field trouble. The whole setup is constructed with an eye to uninterrupted service.

The cooling system consisting of six radiator units, each controlled by two thermostats and direct connected to 3.7-15 hp. two-speed gearmotors, maintains engine temperature at 145-165 degrees. This system begins to function when the circulating cooling water reaches a temperature of 130 degrees. At this point, No. 1 unit goes into service with the other units following at four degree temperature rise intervals until all six are operating at half speed. Should the temperature of the water continue to rise, No. 1 unit goes into high speed with other units following through. Under normal operating conditions, five units at low speed and one at high speed are sufficient even in the middle of the warm days.

Lights on the switchboard indicate which units are in operation and whether they are on high or low speed. Unit speed control is more economical than the use of radiator shutters because at low speed the motors operate on 4½ nominal horsepower, and at high speed on 12½ horsepower, instead of at full motor horsepower, as with shutter control—a considerable saving in power cost.

Present wells are 3,000 to 9,000 feet deep but, with the possibility of deeper production during later development, increased power capacity may be necessary.

To keep 'emfi



THE TUSCARORA—AT77 was built by Levingston Shipbuilding Company of Orange, Texas and designed by Eads Johnson, M. E., Inc. She is 135' o.a. and powered with two 12-cylinder, 2-cycle GM Diesels with direct-connected generator and exciter. Equipment also includes two GM Diesel auxiliary generator sets.

HERE is one of the latest of the U. S. Navy's fleet tugs to go into action. Like more than a score of similar fleet tugs, she is powered with a GM Diesel-Electric Drive. And that means she's also one of the most powerful vessels of her kind—with all the nimble maneuverability it takes to service our fighting craft on the high seas and in port.

CLEVELAND DIESEL ENGINE DIVISION
General Motors Corporation

GENERAL MOTORS
DIESEL

nfighting!

"El Toro" under way to service drilling barges near Morgan's Point on Upper Galveston Bay

DIESEL TUG "EL TORO"

By A. V. REITER

El Toro, "The Bull", is a new tug aptly named. Not only does it have the sturdy lines, the tremendous strength, and endurance the name implies, but also speed. Mr. Chris Harms, owner of the Harms Marine Service Co., whose business is chiefly contract towing, is prouder of *El Toro* than of any other boat in his fleet. When the hull was launched amid a big celebration on Buffalo Bayou, Houston, Texas, it was christened with a bottle of Texas beer by the granddaughter of the designer and builder, Mr. I. B. Peveto. The tug is now operating along the Texas gulf coast out of Orange, the home port. *El Toro* already is making a reputation in the oil towing business similar to that won by the well-remembered *Katherine* which towed many a barrel of oil under the direction of Mr. Harms' father.

El Toro is a champion in appearance and performance with her red hull and stack, and white pilot house with green trimmings. Her hull is of all welded steel, and her superstructure is designed with functional simplicity. The stack bears the Harms insignia with distinction. "She" is 63 feet 9 inches overall, with a 16'-6" beam, and a 7½' draft. In spite of the unusual power of her direct reversing Fairbanks-Morse Diesel, she has an exceptionally quick and smooth response to the controls.

The main propulsion engine is Fairbanks, Morse & Company's latest development of an 8 cylinder Model 35, with 10" bore and 12½" stroke, rated 320 hp. at 400 rpm. The engine has uni-valve fuel injection pumps and is pressure lubricated throughout. Built-in auxiliaries to the engine assure it of proper operation with a minimum of space and piping connections. The soft water circulating pump, bilge pump, and air compressor with automatic unloader are built in and integral with the main Fairbanks-Morse engine.

The boat is equipped with fuel tanks forward and midship, and water tanks forward and aft. Pumps are so piped that the trim of the boat is easily maintained by the shifting of either water or fuel.

The skin cooling system, employing soft water, follows the installation recommended by modern naval architects. Air tanks are American Bureau Approved and built by Diesel Plant Specialties. The engine is equipped with Nugent fuel and lubricating filters.

The exhaust system consists of a water-cooled exhaust manifold, Penflex metal exhaust tubing, and a Burgess spark arresting Snubber.

Although *El Toro* is constructed of steel and is as nearly fireproof as possible, and although steel barges are used for transporting oil, the exhaust spark arresting feature is additional protection. Exhaust temperatures are gauged by an Alnor pyrometer assuring a well-balanced load on each cylinder. The propeller of special design is 58 inches in diameter, 34 inch pitch, with a total blade area of 1510 square inches. It is designed by Mr. A. J. C. Robertson to give maximum efficiency when under full tow, and built by Columbia.

On the trial test, *El Toro* made thirteen miles per hour light draft and with exhaust temperatures averaging 270 degrees F. With a tow of 28,000 barrels of oil, she averaged three miles

Above: Operating side of the F-M Model 35 Diesel engine rated 320 hp. at 400 rpm.

Left: Top view of the main Diesel showing the clean cut cylinder heads and the double Penflex exhaust connection.

an hour with exhaust temperatures averaging 400 degrees Fahrenheit.

The engine room has more space than the average, and the pearl grey finish on the engine and walls is kept immaculate as is the precedent on all Harms Marine Service boats. The well-appointed crew accommodations will quarter seven persons.

The pilot house is outfitted with an eye to comfort, easy maneuverability, and with due attention to shipshape appearance. From the pilot house, full engine control is possible. Electric running lights may be controlled from either the pilot house or the engine room, with the aid of an automatic Kohler light plant.

PAWTUCKET TIMES USES DIESELS

by WM. H. GOTTLIEB

IN an effort to preserve in perilous times its record of continuous, daily publication since 1885, the Pawtucket Times, one of Rhode Island's leading newspapers, has installed a Diesel plant capable of maintaining all operations. This is believed to be the first newspaper in the United States that has turned to Diesel for power. Even in peace, a newspaper considers itself a public utility which must never fail in service to its community. It is a sound journalistic tradition that the paper must go to press. In time of war, the press becomes a vital national information service without which no democracy could perpetuate the "four freedoms."

The Pawtucket Times learned dramatically during the hurricane of September, 1938, the importance of an independent power supply within the walls of its own plant. The storm-wrecked transmission lines over a wide area in New England had cut off the newspaper from its accustomed source of purchased power. In this emergency, an old standby steam plant made possible the production of an abbreviated, eight-page paper.

The war brings not only greater importance to the paper but also greater risks, for the power supply is endangered now not only by the elements of nature but by bombs and saboteurs. Recognizing that the uninterrupted flow of news must be preserved, executives at the Pawtucket Times have assured themselves of a readily available means of switching from purchased power to Diesel generated power in emergencies and to produce their electrical requirements continuously, if desired.

The power demands for production of a large newspaper are extensive and varied. The Pawtucket Times has a connected load of 336 kw. which consists of a 221 kw. motor load, a 90 kw. heating load, and a 25 kw. lighting load. There are 130 electric motors in the plant ranging in size from 1/6th hp. to 100 hp. Power must be supplied to the main press which is capable of producing 45,000 copies of a 32-page paper in an hour, to the business and editorial offices, to the stereotype department with its nine-pot metal heating units and score of machines, to the composing room with its nineteen linecasting machines and a dozen other pieces of equipment, to the machine shop, to the photographic studio for compressors, ventilators, fans and driers, to the paper storage and press rooms for hoists, escalators, pumps and a dozen other purposes, to the freight and passenger elevators. In addition to the usual difficulties resulting from wide fluctuation of load, the publishers anticipated the problem presented by accurate control required for the motors on the Teletype newsprinter machines. In this connection the engine governors selected have proved highly efficient in maintaining close regulation.

Not all the connected load is in operation at one time but the Times has daily peaks of approximately 200 kw. during the afternoon period when the presses are rolling. From 7 a.m. to 2 p.m., the load averages 90 to 100 kw. with peaks of 110 kw. From 2 to 4:30 p.m.

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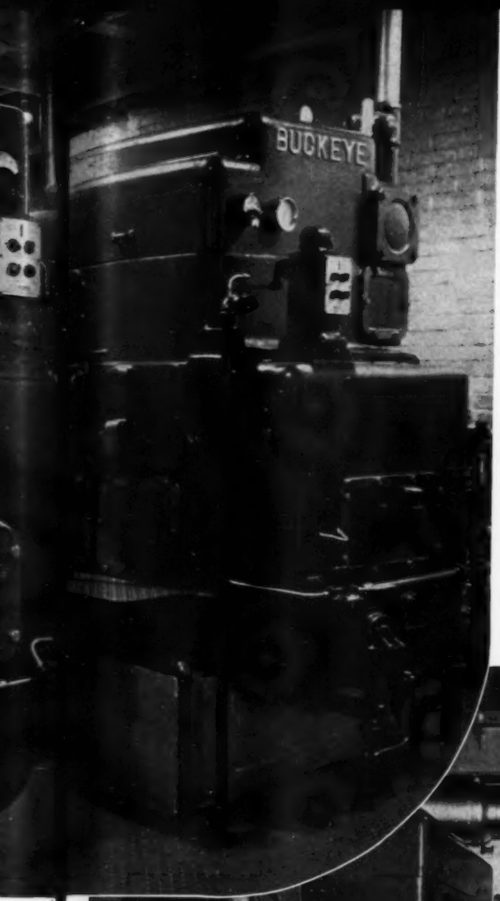
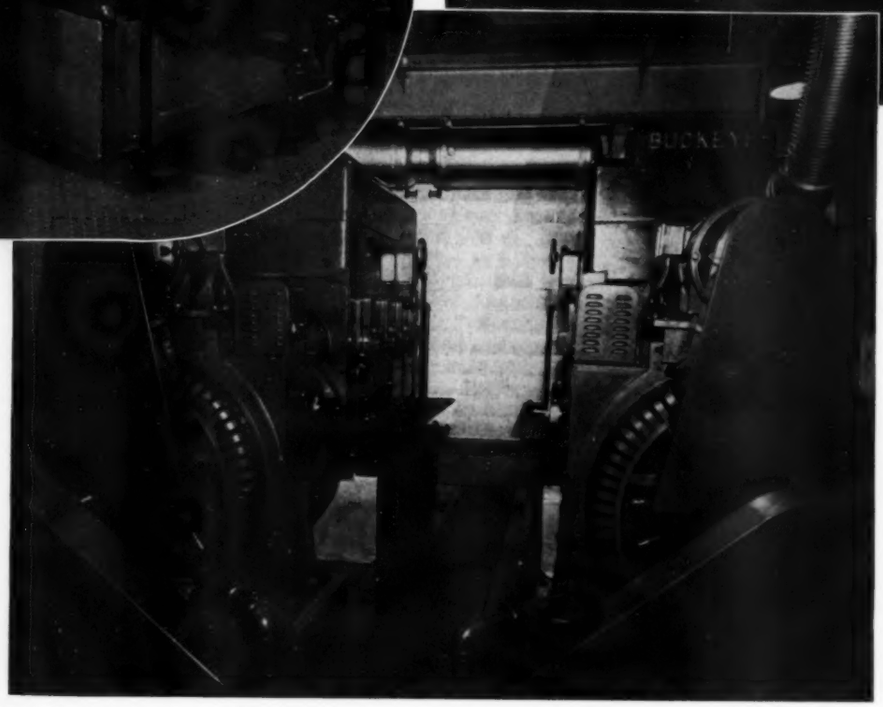


The Curtis air compressor with motor and gas engine drives.



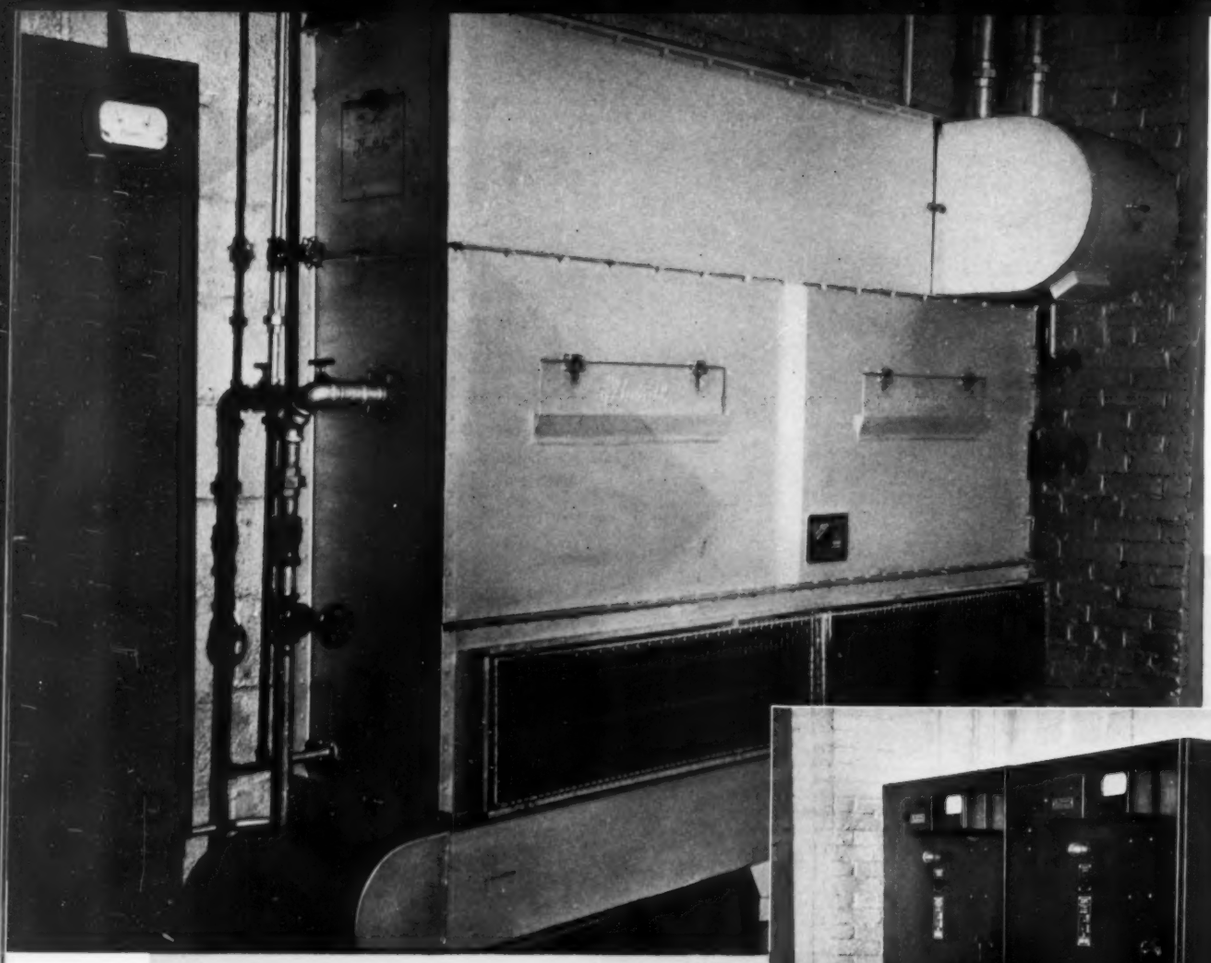
Upper left: Exterior view of the Pawtucket Times plant. Note Burgess exhaust Snubbers. Center view: Note Woodward governors, Alnor pyrometers, Nugent lube filter, left, and Purolator fuel filters. Above: The two generating units. The floor plates around both units cover the Korfund Vibro Isolators and provide easy access for making critical adjustments.

the average is 145 kw. with momentary peaks of 200. The night load drops as low as 25 kw.

After careful study of load conditions, Times' executives decided upon a two-engine Diesel plant. Diesels were chosen because they offered the greatest dependability in carrying the heavy and difficult load and because they promised the greatest economy in power production, as well as simplicity in operation. Pursuant to this decision, the company installed two identical, 190 hp. Buckeye Diesels, each direct-connected to a 125 kw. Electric Machinery generator. The engines are the new Model 70, a compact, well balanced, all enclosed design of the 4 cycle, mechanical-injection type. Each unit has four cylinders of 10 in. bore and 12 in. stroke and develops its rating of 190 hp. at 514 rpm. Following this scheme of compact efficiency are the package style generators which have voltage regulators and the V-belted exciters mounted on the generator housings. Compactness has real value in a newspaper plant where all available space is used for paper storage. The generators produce 240 volt, 3 phase, 60 cycle current which is used directly for power requirements and converted to 120 volts for the lighting circuit.

The two-engine plant makes it possible to obtain a better operating load factor than if all generating capacity were concentrated in a single unit. During the seven-hour period from 7 a.m. to 2 p.m., with one engine operating, the load factor averages better than 70 percent. Both engines may be run to carry the heavier demand between 2 and 4:30 p.m. and the load factor is close to 52 percent. The two engines also provide complete standby protection since it is possible to put out the newspaper with only one unit in operation.

It is apparent in every detail that this plant was designed to meet every existing problem and to achieve convenient, efficient, and trouble-free performance. One engine runs clockwise and the other counter-clockwise so that a man, standing in the aisle between the units, is within easy reach of the centralized controls of each engine. The voltage regulators with voltmeters and ammeters also face on this aisle. An automatic synchronizer has been provided so that all the operator need do to parallel the Diesels is bring the second unit to speed whereupon the generator switch closes automatically and the two generators operate in parallel. Each engine has a relay governor which can be controlled from the switchboard. On each engine, too, is a lube oil pressure gauge and an exhaust pyrometer



The Buffalo evaporative unit which handles cooling of both Diesels within small floor space.

The E. M. switchboard, voltage regulators, and automatic synchronizers.

with selector switch. Thus, the operator can do his work quickly, for the company's engineers see no need for keeping a man in attendance more than a few minutes a day. There is no lack of protective devices. An alarm sounds if cooling water temperature rises 10 degrees. The Buckeye "Silent Watchman" shuts down an engine automatically on the event of failure of either lubricating or cooling systems.

Since the engine room is close to the business offices and the building houses the editorial offices and much machinery in precise adjustment, it was essential to isolate the natural operating frequencies of the engine. This has been accomplished effectively through use of Korfund Vibro Isolators and flexible connections. Both engines and their generators are mounted on a single concrete foundation which is supported above the steel-reinforced concrete sub-base on a set of eight Korfund Vibro Isolators. A total weight of 184,000 lbs. rests on these spring units. The space between the sides of the engine foundation and the sub-base is sealed with cork blocks and painted the color of the floor. The isolation effected by critical adjustment of the Vibro Isolators is entirely successful in preventing transmission of power pulsations and structure-borne noise to the rest of the building. All connections to the Diesels, including water, fuel, intake air, starting air and exhaust, are flexible hose, thus completing the desired insulation.

The plant is in the heart of the city and exhausts must be muffled. The exhaust gases pass from the headers into vertical pipes extending through the roof of the one-story section and then through horizontal pipes to the pair of silencers set vertically against the wall of the main building. The silencers are supported on specially designed, light-weight, frames of wood and steel with allowance for expansion of the exhaust pipes. Intake air is drawn from engine room through silencers.

The No. 2 fuel is stored in a 3,000 gallon underground tank inside the building from which it is sent to the 110 gallon day tank under the engine room floor by a motor driven

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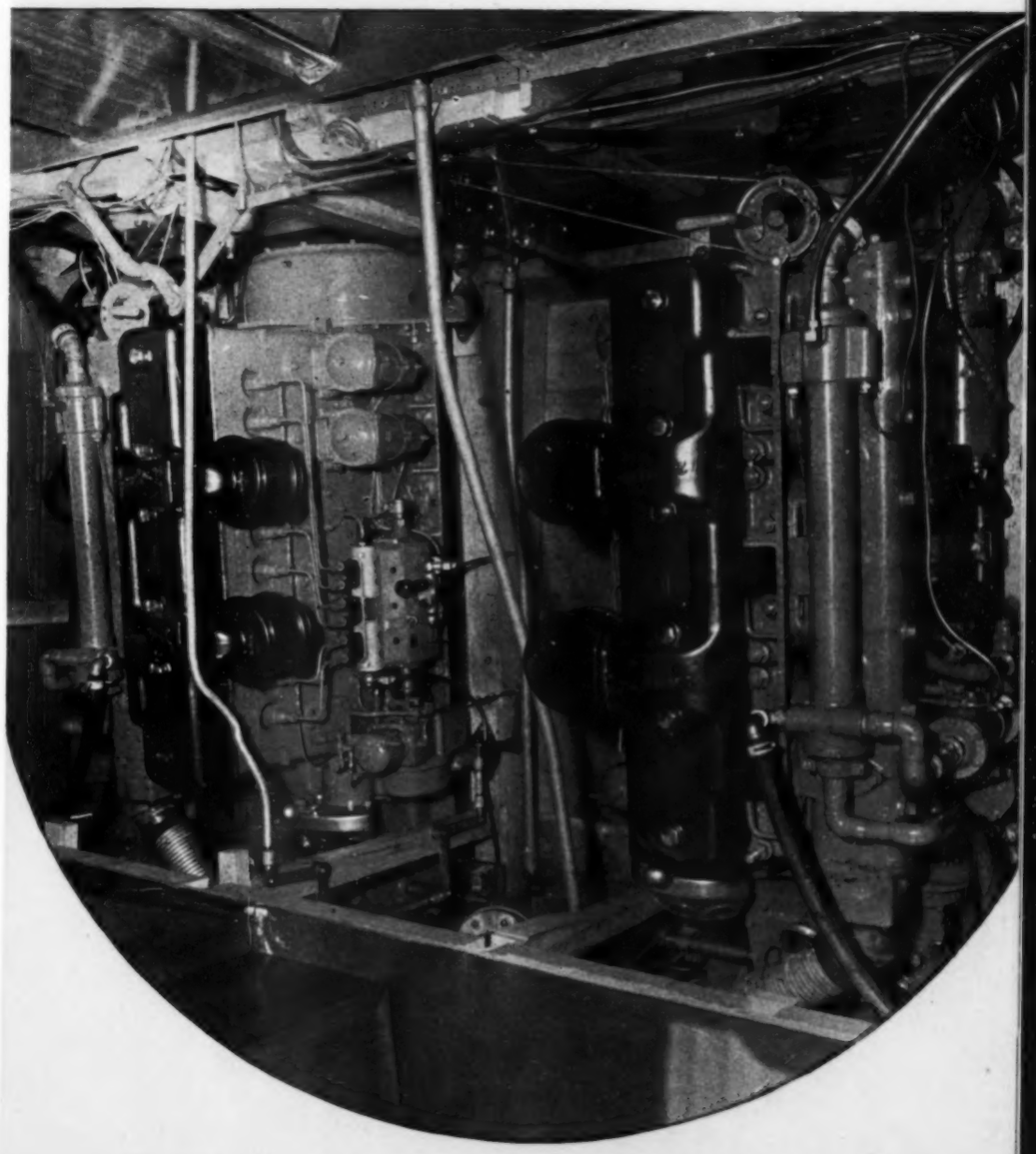

CAZADORA-A DIESEL CRUISER

By JIM MEDFORD

DISCRIMINATING West Coast yachtsmen, particularly those who cruise or fish off-shore, are showing an increasing interest in the low cost and wider cruising range made available by the modern marine Diesel. This, combined with the lessened fire hazard and the ability to utilize full engine horsepower rating on extended trips, was the prime mover in Mr. Howard Kresge's selection of Superior twin Diesels to power his new deepwater sportfisher, *Cazadora*.

Designed and built by the Lowman Boat Works of Costa Mesa near Newport Harbor, California, the cruiser, 48′ overall, extreme beam 13′, draft 3′ 6″, at full throttle makes 14 knots as shown in trials.

The engines are true right and left Models MA-6 and MA6L rated 110 hp. at 1800 rpm., with an operating range from idling speed of 400 rpm., a flexibility appreciated when working the off-shore fishing grounds. Her fine turn of speed makes for longer fishing hours and shortens the fisherman's idea of time wasted enroute from and to home port.

Built for strength and seaworthiness, *Cazadora's* frames are 2 by 2 in. bent white oak with 1¼ in. spruce planking, teak decks and mahogany house and trim. All fittings are chromium plated and standard manufactured. Accommodations include private stateroom forward, a large after cabin with dinette, double berth and settee. The galley with range, electric refrigerator, dish lockers, and ample stowage space, is amidships to port. Washroom and toilet is opposite to starboard. Upholstery is an attractive combination of blue and tan.

In appearance the cruiser is modernish nonchalant, this accentuated by the raking hollow steel mast that serves also as exhaust head and engine room ventilator, an exclusive idea featured by the craft's designer, Niles Lowman, in response to the owner's request to eliminate the usual funnel and unsightly ventilators. The clean air in the engine room and an absence of fumes throughout the boat, particularly in the cockpit when fishing or backing, attest its correct engineering principles and efficiency.

Equipment details include 550 gals. fuel of 28-32 gravity for 1,000 miles of cruising; 300 gals. fresh water in copper tanks; lube oil is Kendall SAE 20 filtered by Purolator as is the fuel oil; Maxim exhaust silencer; Gould batteries; Tobin bronze shafts with 22 by 12 in. wheels by Pitchometer; Morse vibration dampener shaft couplings; CO_2 fire extinguishers; Ross heat exchanger for the closed fresh water cooling system.

CASEY, ILLINOIS

Changed from steam to Diesel

By J. ALBERT BALL*

CASEY, Illinois, a town of some 3,000 people, is in eastern central Illinois. Beside all the residential and commercial power load, the plant furnishes power to a shoe factory which is a sizable load for a town of this size. Casey has owned a municipal steam power plant since 1903 and last year installed three new Worthington Diesels. The actual installation was a feat well worth commenting upon, in that service was not interrupted while the new engines were put in place on the exact spot occupied by the old ones. Worthington Pump and Machinery Corp. of Buffalo, N. Y., accepted the complete contract for remodeling the building and erection of switchboard, floor, and engines. Parts of the work, however, were sub-contracted. It was specified that the three new engines be erected in the same room in which two old single-cylinder steam engines (each 180 kw.) were in operation. The switchboard was to be moved to another location, and service maintained. The first move was to install one of the new engines in a temporary building about 150 feet from the operating floor. The grout had been poured for this engine less than 72 hours when one of the overloaded steam engines wrecked itself and the new Diesel was put into immediate service—not to stop for three months!!

The wrecked steam engine was taken out through a hole cut in the front of the building and the foundation removed to make way for the foundation of two new Diesels. This work was hampered by cold weather and labor troubles. With the new Diesel, however, running 24 hours a day on the temporary foundation and the remaining steam engine helping on peak loads, the city was lighted constantly.

While the first two Diesels were being placed, one of the old boilers was being removed. As soon as these two engines were in service, the steam plant was shut down for the first time in many, many years. Then the remaining boiler and steam engine were removed, to make way for the third Diesel—which was still operating on the temporary location. The third unit was set on a foundation alone, with the city water main running through the plant between the bases of the engines and not as deep as the bases. Vibration would have caused trouble with the leaded joints on this main and cut the entire town out of water.

By March 15, 1940, the three Diesels were all running on permanent bases. The location of the plant is of interest in that it is in the business district of town. On one side is a poultry house, on the other a garage, across the street is a bakery, grocery store, etc. Behind the plant rises the water tower for the city pressure, and the rear of the lot is on the Pennsylvania Railroad spur track, so that fuel oil is pumped directly from cars to storage tanks.

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* *Chief Engineer.*

Storage is provided for 15,000 gallons of fuel, a normal supply for 30 days' operation. Fuel is moved from this storage tank to the three day tanks—one for each engine—by a Worthington rotary pump. From the day tanks oil goes to the three Worthington four-cycle, six cylinder, 13¼" x 17½", solid injection engines. Running at 327 rpm. the engines are rated at 450 hp. The direct connected Elliott generators are rated 300 kw. at 80% power factor. Worthington V-belt drives are used for exciters. Thus, the plant has a capacity of 900 kw., as compared with the old, overloaded steam plant which was rated at 360 kw.

Equipment for the engines includes: Woodward IC governors, American Bosch fuel injection pumps and spray nozzles, Manzel lubricators, Maxim silencers, and Alnor pyrometers. The three silencers are inside the building and exhaust up through the roof. The silencers are steel jacketed and Sturtevant fans are used to circulate warm air through the building in cold weather. Lubricating oil is circulated through the cooler using jacket water for cooling. Cleaning the oil is so arranged that the operator has very good control over it. A Hilco, type C filter was installed and connected so that the oil may be run through the filter from any engine either as a batch filter, continuous filter, or transferred from one engine to the other, or run to a sump tank. This is accomplished by piping all engines into a header, leading either to the sump tank or to the filter. The filter discharges into another header which discharges into any engine, the sump tank, or a barrel for surplus oil. It has been found most satisfactory to filter the oil from the engine which is running, thereby having hot oil and speeding up the filtering.

The switchboard, fabricated and installed by the Atkinson Armature Works, is all General Electric equipment except the Westinghouse Silverstat regulators. One regulator is connected to each generator. Three engine panels at one end of the board put the current on the board. Then a regulator panel, and outgoing panels comprised of one "plant" circuit, three street light circuits, and four general distribution circuits. A master clock has been installed and for the first time in the history of the town electric clocks are being sold with satisfaction.

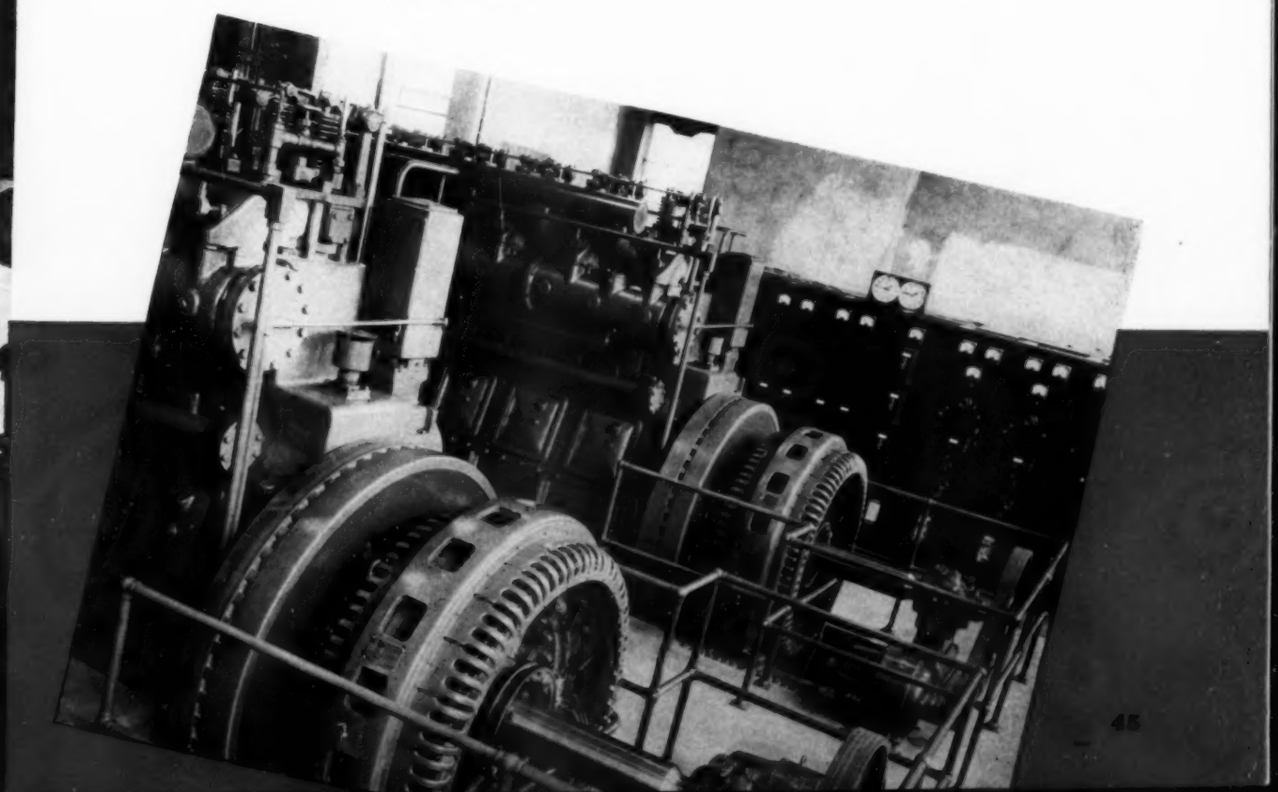
Cooling water is circulated through the engines, then, depending upon temperature, it is either put into the pond below or up over the cooling tower. The City is treating water with Inflico water softener, to provide suitable jacket water. Three circulating pumps operating in parallel are provided to handle water.

With the removal of the old boilers the new plant is now composed of two rooms, although they are separated only partially. The main room, housing the engines and switchboard, is 24 by 48 feet. The old boiler room is now vacated and makes room for a shop, toilet facilities, and storage. The floor is tile red, using Metalacron, which was placed in the concrete before finishing. The engines are dark gray, the foundations a lighter gray, the flywheels are royal blue, and all valve handles and numbers of engines a bright red. With the cream colored walls the plant presents a very neat, clean appearance.

The output has shown a steady gain since installation began. Early morning hours the load is around 100 kw. A peak of about 450 kw. is reached, and a daily output of about 5,000 kwh. is the present load. Records kept on the engine operating temporarily show for the first three months' period (2,032 hours), an output of 11.74 kwh. per gallon of fuel.

Adding oil through the lubricator at the rate of one gallon for every 7,500 hp.-hrs. shows a slight gain in the crankcase. Such oil is removed, filtered, and mixed with new oil, to be used again. Texas Ursa oil is used throughout.

The $115,000 bonds necessary to make this plant possible are to be paid out of earnings. During the first three months of Diesel operation, the department showed a saving of over $1,000 per month as compared to the old steam plant: This with an income of approximately $4,800 per month.

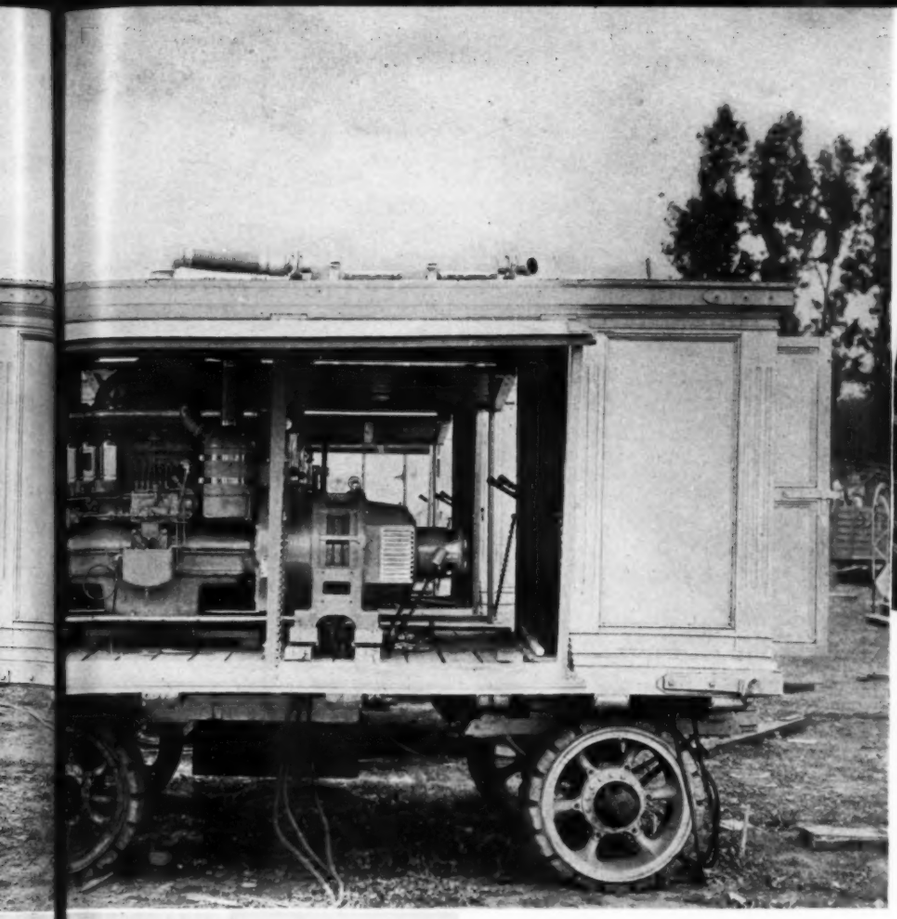


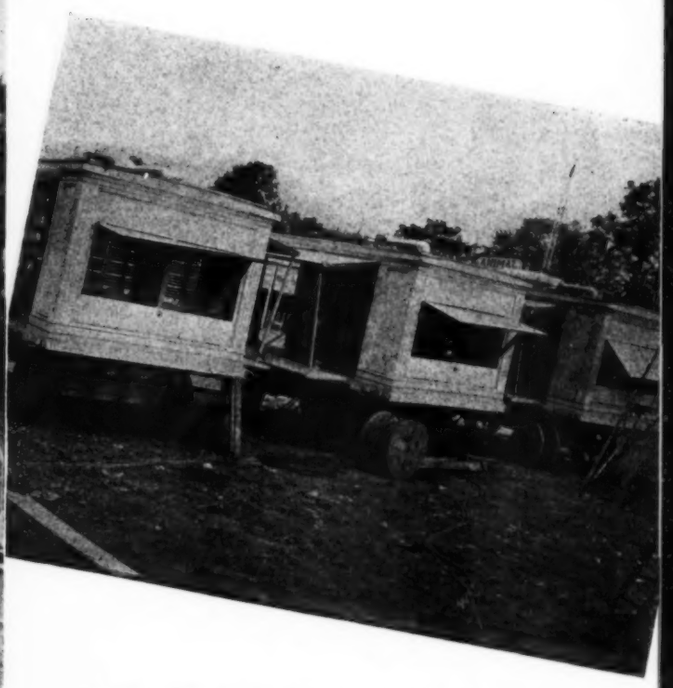
Left: View showing the Worthington Diesels which replaced steam units in the Casey, Illinois, municipal power plant. Note Manzel lubricators. Below: Two of the three Elliott generators and the G.E.-equipped switchboard.

DIESELIZED WORLD OF MIRTH

By WILL H. FULLERTON

The three International Diesel generating units, mounted in trailers, are lined up in the middle, while amusement devices are set up all around.





These complete Ready-Power electric plants, powered with International Diesels, supply current for brilliant lighting and numerous motors.

THE World of Mirth Shows recently purchased nine International Diesel generating units, each of which operates a 50 kw. Ready-Power electric plant. The sets are complete with switchboards, mufflers, etc., and produce 120-220 volt single-phase alternating current, energy being distributed by a three-wire circuit.

The nine sets are mounted in white circus wagons as shown. An attractive feature of the power units is chromium plated radiator, air filter, pipes, and other parts. Stationed, as they are, in two groups in the midst of this big carnival, these electric generating sets, steadily humming along to produce the electricity that makes the big carnival possible, provide a show all their own. J. L. Edwards, chief electrician, never lacks an audience. Continually, he is telling how this big battery of powerful Diesel engines produces 450 kw. of electricity to operate the show's many motors and to keep it brilliantly illuminated at night with thousands of electric lamps, several miles of neon tubing, and much modern fluorescent lighting—enough to take care of all the ordinary requirements of a city of 15,000 people. Again and again, he points up to the six 75-foot light towers trimmed in neon and tells about their fifteen 1,000-watt flood lamps and their three 2,000-watt revolving search lamps similar to those used on modern U. S. battleships.

The slogan of the World of Mirth Shows is "World's Largest Midway." Its general offices are at 10 Rockefeller Plaza, New York. Max Linderman is general manager. There are some fifty typical midway attractions. To convey the equipment for these various attractions from city to city requires nearly 3,000 feet of privately owned train including forty 72-foot flatcars to transport 130 circus wagons. The show's personnel consists of 850 men, women, and children, most of whom travel by automobile and modern auto trailers from place to place. For thirty weeks, the show makes one-week stands in important cities in twelve Eastern States and Canada, wintering in Richmond, Va.

Another interesting use of International Diesels in the World of Mirth Shows is made to operate an airplane-type of amusement device called a "Spitfire." The power unit, the recently designed 31.5 hp. is shown in accompanying illustration with workmen assembling the Spitfire just a few hours prior to the start of a week's run in New Britain, Connecticut.

A fleet of seven International wheel tractors, one of them the new streamlined Model I-6 and two T-40 crawlers are also used to speed the work of assembling and dis-assembling the equipment. Five International trucks which pull 24-foot trailers are also utilized to move the equipment to and from the trains.

Air View of the Minnkota Power Cooperative Inc., R.E.A.-financed power plant recently put into service with three 1000 hp. Diesel generating units and provision for three similar units later. *Grand Forks Herald Photo.*

LOCATED just north of the city of Grand Forks, North Dakota, on U. S. Highway 81, is the new and beautiful R.E.A.-financed generating plant of the Minnkota Power Cooperative, Inc., which has been designed and built to generate electricity for more than 10,000 farm homes located in northwestern Minnesota and northeastern North Dakota.

This beautiful but simple plain brick structure not only houses some of the finest and latest in the way of Diesel equipment, but also represents an excellently designed and engineered structure which has earned for it such compliments as "the finest Diesel generating plant in the world."

The new plant, which has just recently been placed in operation, has been designed to house six 1000 hp., 300 rpm. Cooper-Bessemer Diesels, three of which have been installed to date and placed in operation. The remaining three engines have been ordered and plans for their installation are now being prepared. The engines are direct connected to 720 kw. unity pf. Ideal Electric 2400 volt generators.

The electrical output of these machines is measured and controlled by means of instruments on an eighteen section metal clad switchboard which was constructed by the Allis-Chalmers Manufacturing Company. The switchboard measures twenty-one feet long, eight feet high, and is four feet deep. The board is equipped with Allis-Chalmers voltage regulators and automatic synchronizing equipment, Weston indicating instruments, Esterline Angus recording instruments, and Westinghouse watthour meters and switches. The auxiliary equipment panel provides for the control of all auxiliary equipment incidental to the operation of the units, as well as an Edwards indicating annunciator system and automatic shutdown arrangement in the event of low or high fuel supply, high water temperature or low oil pressure. Low oil pressure is the only condition capable of automatically shutting the engine down in addition to sounding the alarm. Pilot lights under all switches indicate the operation of all auxiliary equipment when in use. Exhaust temperatures of each cylinder are also read on this panel by means of an Alnor 0-1000°F. twenty-four point instrument.

The generating units are installed on solid concrete foundations measuring twenty-eight feet long, ten feet wide and nine feet high. Each foundation consists of approximately eighty cubic yards of concrete which is insulated from the earth and concrete footings by a layer of cork two inches thick. This has been found to be very effective in damping out operating frequencies from the engines which would normally be transmitted to the rest of the building and surrounding properties.

Each generator is excited by means of a 15 kw. Ideal Electric exciter which is V belt driven by means of a large pulley on the end of the engine drive shaft. The integral flywheel of the engine and V belt drives are both enclosed in expanded metal guards.

The air intake for each engine is located on the roof of the auxiliary room portion of the building. The incoming air is passed through American, type 4-OCH, four cell filters and is brought to each engine through a 12″ pipe. The exhaust from each engine is taken from each engine to a point underneath the floors by means of a 16″ pipe from where it is passed into three Burgess 12″ special combina-

• *Manager, Minnkota Power Cooperative.*

Interior view showing three Cooper-Bessemer Diesel generating units now installed, the switchboard and plate glass observation window. Foundations for additional units in the foreground.

Front end of one of the large Diesels.

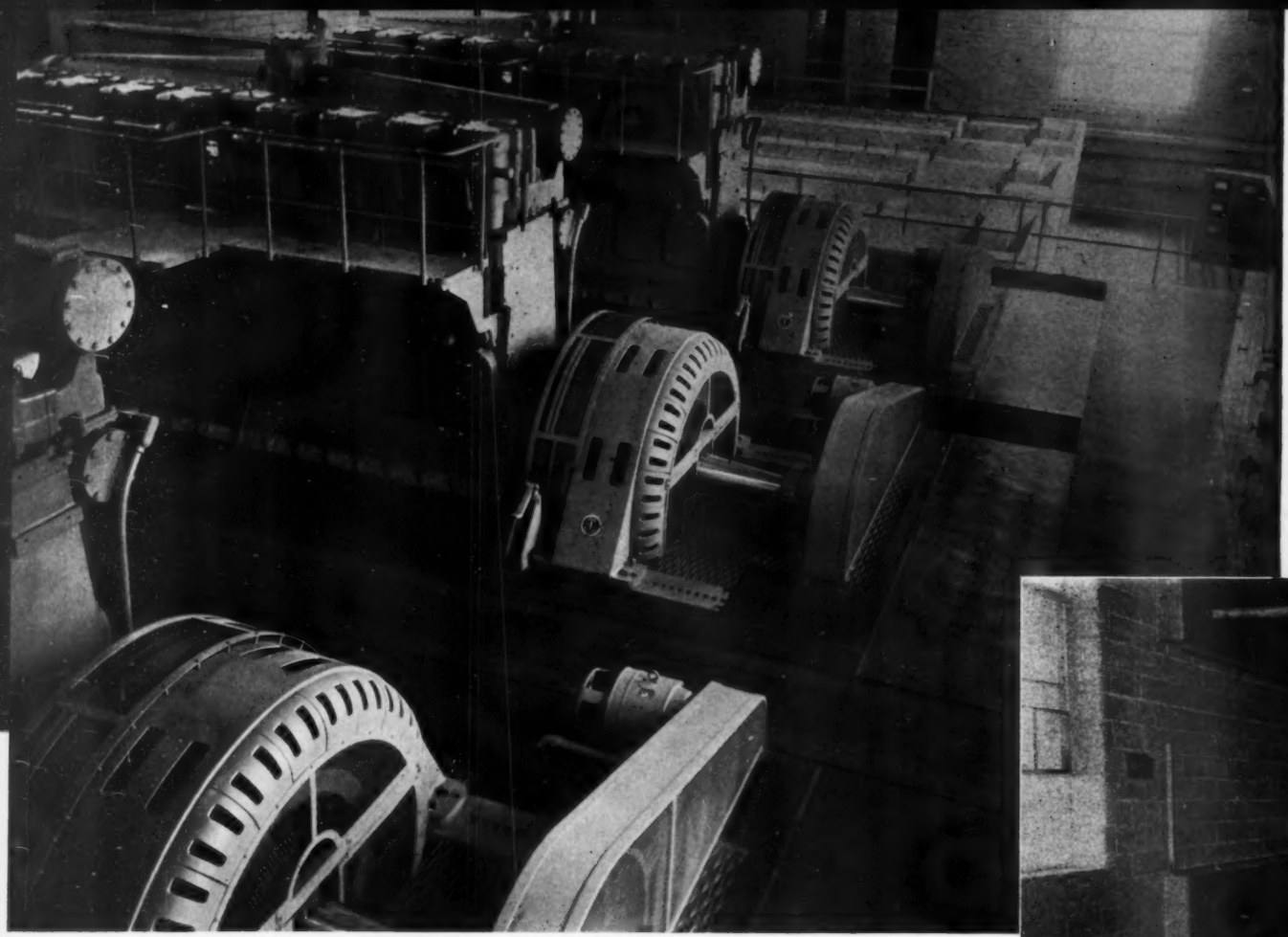
COOPERATIVE:

PLANT

EEMAN*

tion waste heat boilers and Snubbers before being exhausted to the atmosphere. The waste heat boilers are interconnected to a large Kewanee oil fired boiler and are used in heating the entire plant building. The interconnection between the waste heat boilers and the large Kewanee boiler provides for the starting of the large boiler whenever the waste heat boilers are required to furnish more heat than they are capable of delivering. It is estimated that the exhaust of three engines at full load will adequately supply sufficient heat to care for all requirements of the large building in the severest weather.

The lubricating oil for each engine is stored in a 300 gallon sump tank located at the base of each engine. The lubricating oil is passed through a Cuno oil filter and is continuously



Engine room view showing the three generating units. Note Pickering governors, Ideal generators and exciters.

refined by means of individual Honan-Crane oil filters. The oil is cooled by means of a Ross 1204-CP cooler.

Each engine is equipped with a 600 gallon day fuel tank which is located in the basement alongside the engine. The tanks are equipped with a Penn high and low fuel alarms which are connected to indicate both on the auxiliary panel of the switchboard and small horns located in the engine and auxiliary equipment rooms. Levelometers are also used to indicate the amount of oil in each tank. Oil from the day tanks is transferred to a small ten gallon tank located in each engine by means of a small ½ hp. Fairbanks-Morse and 5 gpm. pump. The fuel to each engine is measured individually by means of a 1" Pittsburgh meter. Oil storage for the engines consists of five underground tanks, all of which are accessible by means of an underground tank house which is joined by a tunnel to the basement of the plant. Three of the tanks have a capacity of 40,000 gallons each, while the other two have capacities of ten and twelve thousand gallons each. All of the storage tanks are equipped with Levelometers.

Provisions for receiving incoming oil include both a truck unloading station and tank car unloading racks. All oil received is passed through Pittsburgh fuel strainers and metered before being placed in the storage tanks. Before oil is used in the engine, it is again passed through Pittsburgh fuel strainers and a Briggs Model F-3600 clarifier, after which it is returned to a storage tank designated as a clean oil tank. From the clean oil tanks it is transferred directly to the day tanks of the engine by means of a Goulds pump driven by a 1½ hp. General Electric three phase motor. To handle heavier oils and also take care of the problem of winter time handling of fuel oil, Sims steam coil heaters have been installed in each storage tank. Provisions have also been made to supply fifty pound pressure steam to the unloading racks for use in unloading incoming cars of oil. A Sims steam heater is also provided for warming the oil before passing it through the Briggs clarifier.

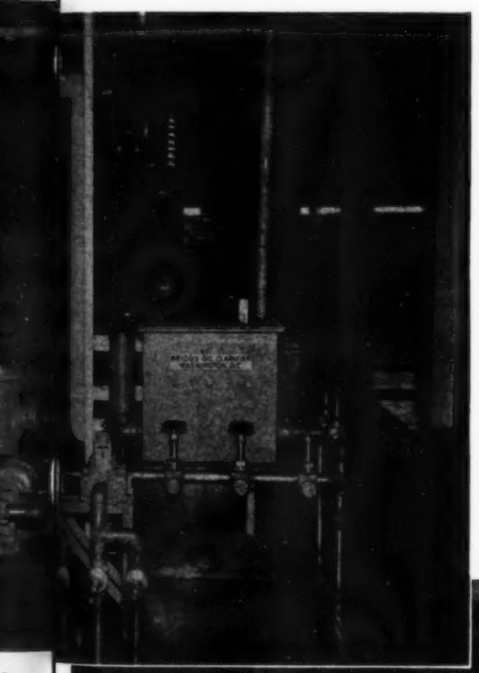
The cooling system employed is a typical closed system in which each engine is equipped with a Worthington Pump and Machinery Corporation evaporative cooler. The circulating

Part of the fuel system showing Pittsburgh meters, Sims heater, and Briggs clarifier.

water is pumped by means of Weinman one stage pumps driven by 10 hp. Ideal motors. The cooling water arrangement has been designed so that any circulating pump or evaporative cooler can be used with any engine or vice versa. Of special interest is the control arrangement of the damper on each cooler. These are thermostatically controlled by means of motors which have their control equipment located in the cooling water circuit. By means of this arrangement, it is possible to control automatically the position of the air damper in the cooler so as to coincide with the temperature of the jacket water. This arrangement is said to be somewhat of an innovation

in damper control equipment in that the usual method of damper control employs the temperature of the air drawn through the evaporative cooler instead of cooling water temperature.

Water used in the plant is purchased directly from the water mains of the city of Grand Forks. Before being used, however, it is softened by means of an entirely automatic Permutit water softening system which has a capacity of 9600 gallons every four hours, on seven grain hardness water. Soft water is used throughout the entire plant with the exception of the outside spigots and the toilets.



Engine starting equipment in the plant consists of three 20" x 60" air starting tanks, a Wagner electric motor driven Curtis compressor and a Cooper-Bessemer engine driven compressor as a standby.

Emergency station lighting and operation of the circuit breakers in the switchboard and substation is provided by means of a 60 cell bank of 160 AH storage batteries which have been furnished by the K. W. Battery Company. The charger is a General Electric automatic model No. 27.1 H.

The station substation is located outside the building and consists of two 75 kva. and two 50 kva. Moloney transformers. The station panel and station meters are manufactured by Westinghouse as is the lighting cabinet which has forty branch circuits.

The master substation located near the plant is composed of four 2400/34,500 volt, 500 kva. Moloney transformers and four 2400/12,500 volt, 333 kva. Moloney transformers. The 34,500 volt circuits employ two 600 ampere Delta Star circuit breakers, whereas the two 12,500 volt circuits employ 100 ampere Pacific electric breakers, all of which are controlled from the generating plant switchboard.

The electrical output of the plant is transmitted to seven R.E.A. financed distribution cooperatives at voltages of 34.5 kv. and 12.5 kv. Separate panels in the switchboard provide for the measurement of current in these circuits as well as the remote control of accompanying circuit breakers located in the substation just outside the plant.

A totalizing panel in the switchboard provides for the graphic recording of the total kw. demand and bus voltage on Esterline Angus meters. A Westinghouse watthour meter records the total kwh. output.

Other panels include a separate exciter and generator panel for each unit installed as well as spare compartments for the three additional units now under construction. A remaining panel is used to house recording instruments and switching equipment on the State Mill and Elevator circuit, with which this plant is interconnected, and which provides one of the interesting sidelights of this installation.

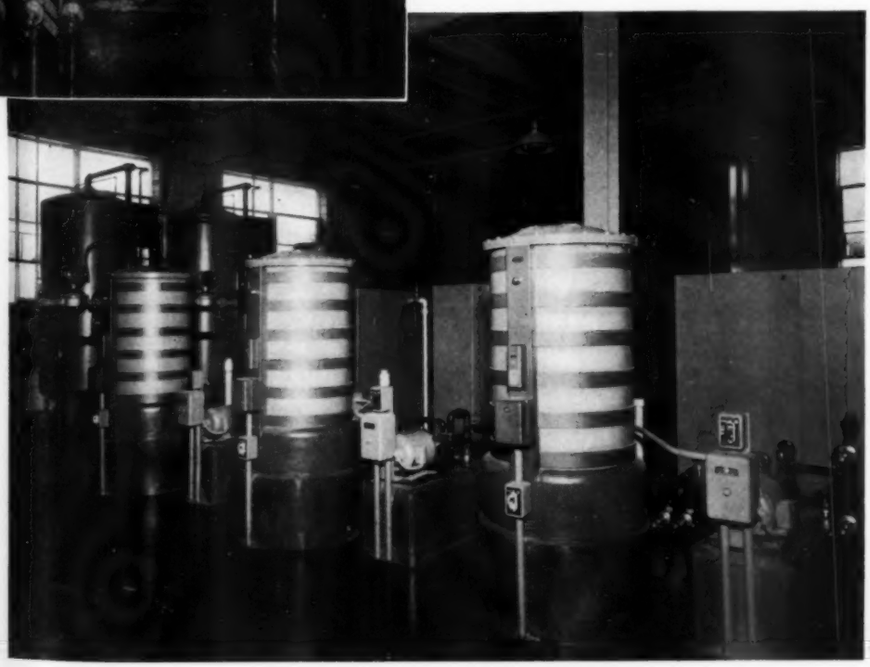
Characteristic of all typical R.E.A. grounded systems is the low leading power factor condition encountered at light loads, the opposite of which is usually found in manufacturing plants employing induction motors where no corrective devices have been installed to correct this condition.

The North Dakota State Mill and Elevator is just such an installation. Many, both large and small, induction motors are used to drive their elevators, mills and various auxiliary equipment and this condition combined with their rather large heating and lighting load creates a lagging power factor. By merely interconnecting these two systems it has been possible to secure sufficient power factor correction to make such a connection highly worthwhile. Other advantages resulting from such an interconnection include standby service in emergencies and also the fact that it gives the Mill an opportunity to shut down its power generation equipment completely over week ends and holidays when the Mill is not in operation and thereby effect a substantial saving in the operating costs of their own power plant.

The panel on the switchboard for this interconnection has an Esterline-Angus graphic 800-0-800 kw. reading meter which is for the purpose of instantly telling what exchange of power, if any, is taking place. Two watthour meters record the power transferred to or from the Mill and an ammeter shows the current flow in all three phases. Provisions are also made for synchronizing the plant with the Mill. A 500,000 circular mill underground

. . . . *And now please turn to page 60* . . . .

Three Honan-Crane purifiers handle the Diesel lube oil.



A WAR MESSAGE
to
ALL EMPLOYERS

★ From the United States Treasury Department ★

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An important part of the billions required to produce the planes, tanks, ships, and guns our Army and Navy need must come from the sale of Defense Bonds. Only by regular, week by week, pay-day by pay-day investment of the American people can this be done.

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Editor—DIESEL PROGRESS

West Coast purse seiner type which Army and Navy favor for off shore and coastwise chores. Propulsion unit on the Col. Leon M. Logan is this 600 hp. Atlas Diesel.

COL. LEON M. LOGAN

By CHAS. F. A. MANN

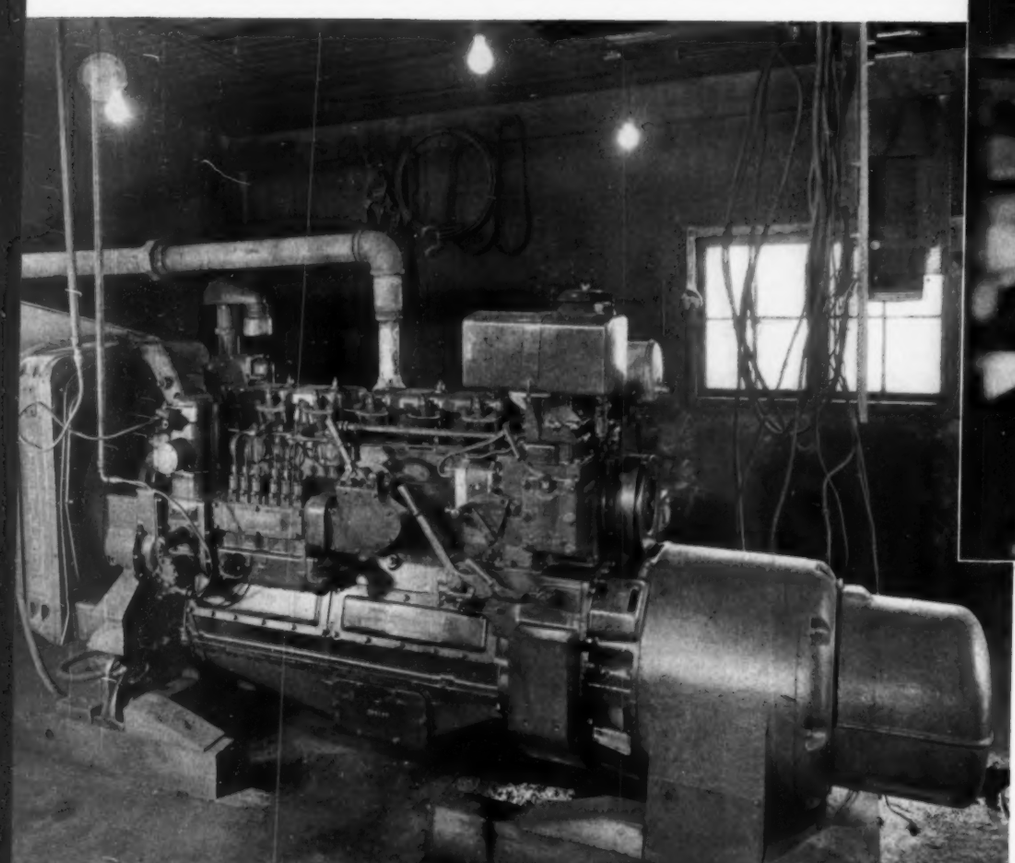
FOR the past ten years this publication has, from time to time, given vivid examples of the remarkable economy, long life and flexibility of the heavily-built, wooden-hulled fishing and commercial craft turned out by Puget Sound shipyards. Almost 100% of them propelled by Diesels, these vessels have found wide fields of usefulness as various types of fishing craft, tugs, freighters, mail boats, tenders, passengers carriers, and special Government ship types for specific duty. These vessels have been turned out by the thousands, literally, during the past twenty-five years, on a design based on heavy Douglas fir keel, framing, and planking, one-man pilot house control, and Diesel propulsion, either with or without separate Diesel auxiliary power. In later years, the Puget Sound design has climbed into the 75-90 foot class, from the old 40-50 ft. size, with the 100-140 ft. size of hull with elaborate modifications for southern tuna fisheries.

It remained for the Army to seize the idea of value and huskiness in the basic purse seiner design and, during the past eighteen months, the Quartermaster Corps has been shopping for almost every available seiner hull, new and old, for adaptation to their coastal and offshore chores in connection with defense. What the Navy hasn't gobbled up, the Army grabbed, so adaptable are these ships to heavy and rough usage, long mileage between refuelling and ease of maintenance.

One of the classic examples of this quick conversion for special Army duty is the *Col. Leon M. Logan*, a U. S. Army Junior Minelayer type, built from a standard 95½ x 24 x 12 ft, purse seine hull of 182 gross tons, conventional pilothouse control, squared stern, and two-level deckhouse built over the engine room. Originally begun as a purse seiner by Western Boatbuilding Co. of Tacoma, she was taken over by the Quartermaster Corps of the Army for conversion to an all-purpose, interport ship for Alaska duty. The plans were in charge of Lt. Col. Wm. G. Brey, representing Maj. Gen. Simon B. Buckner, Commander of the Alaska Division of the Army.

She carries a six cylinder 400 hp. Atlas Diesel, developing full power at 300 rpm. and swinging a three-bladed Coolidge propeller. She carries a four-cylinder, 60 hp. 600 rpm. Atlas auxiliary turning a five kw. Westinghouse D.C. generator which, in turn, charges a 110 volt Willard battery set. A three kw. auxiliary generator is belt-driven off the main engine for normal battery charging. The auxiliary Diesel also operates a conventional line-shaft drive for deck machinery, through a clutch system and chain drive. An Allen oil fired hot water heating boiler is provided, as well as large fuel bunker space for 5,000 miles cruising radius at nine to eleven knots speed. She carries Western Boatbuilding cargo anchor winches, and an oil-fired galley range and Frigidaire unit. Crew space for seventeen men is provided in the deckhouse and either 200 tons of cargo or 100 men can be carried on short trips in the lower hold, aft, normally the fish hold of a seiner.

She is sheathed in Australian ironbark for working in ice, carries powerful radio equipment, and is painted the drab Army brown from top to bottom, making her almost invisible at a distance.



Upper left: The two hotels at Willits, Calif., completely powered by one Diesel generating set. Above: Owner, Elwin Van Cleemput. Left: The Diesel that saves $100 to $125 a month.

TWO HOTELS, ONE DIESEL

OUT in Willits, Mendocino County, California, electricity for two hotels, a laundry, coffee shop and owner's home is Diesel generated. Owner Elwin Van Cleemput of Willits was paying a considerable monthly sum for electric power when he decided to "go Diesel." He purchased a Caterpillar Diesel-electric set which was installed December 1, 1940, and has operated it 24 hours a day since the installation. The engine uses 2¼ gallons of seven-cent fuel per hour, according to the owner, who likewise reports a savings of from $100 to $125 per month since switching to a Caterpillar Diesel engine.

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Care and Maintenance of Auxiliaries

By R. L. GREGORY*

ABOUT a month ago, while passing through one of our small midwestern cities, I decided to stop for a few moments and visit its Municipal Power Plant which was Diesel equipped. It was my first visit to the plant and when I stepped through the door onto the operating floor, I was immediately impressed with a sight which is always appreciated by the engineering fraternity—the plant and equipment was immaculately clean. There were four units in the plant, all of which were nicely painted. The copper piping, valves, hand rails, and trim were brightly polished. Tools were neatly arranged on tool boards; floors clean and free from refuse and the whole reflected a great deal of care and attention by the men in this plant.

I looked over the units and other equipment and noted from the interconnections on their piping system that they were well arranged and fortified for emergency breakdowns so far as their auxiliaries were concerned. I questioned the member of the plant personnel who was showing the equipment to me concerning their auxiliaries and their interconnected piping arrangement. He told me that they had a very flexible system, and that all the auxiliaries were located in the basement. I then asked him if I could see this part of the plant. I noticed that he rather hesitated, but finally said "yes," and we went into the basement.

Here I had the surprise of my life. The contrast between the immaculately clean equipment on the operating floor, and the neglect and inattention given to the auxiliaries was astounding, and immediately I was aware of the attendant's reason for hesitating to conduct me to this part of their equipment. The floor was greasy and dirty, water dripping from the packing glands on the various pumps ran down on the floor and mixed with oil and grease. They had two water softeners which were corroded, rusty and covered with months of accumulated dust. Their filtering equipment was sadly in need of a good cleaning up, and two air compressors looked as though they had served the place from decades back.

The contrast was so great that I asked the attendant why the equipment in the basement was so neglected, when that on the operating floor reflected such care? "Well," he said, "I will admit that there is some contrast, but, you see, our visitors seldom come down here. Consequently, we do not give as much attention to this part of the plant. Then, too, this equipment never gives us much trouble, so we give it very little attention. If we do have difficulties, due to our system of interconnected piping and arrangement, we merely start up another pump, and fix the broken one when we find time."

Now this is far from a typical condition in most of our plants today, but, as was evidenced in this particular plant, such conditions do exist. And the point which I wish to stress is that it is just as vital to inspect periodically and care for your auxiliaries, as it is to inspect the fuel apparatus, pistons, or any other parts of the unit proper.

In this particular plant, the personnel was aware that it was amply provided with auxiliary capacity, which, due to its particular interconnections, could be used on any of the units in operation. Hence, they felt justified in giving more attention to the units themselves and their appearance which the average visitor would encounter, at the expense of the auxiliary equipment.

Most plants, however, are not as fortunate in their auxiliary arrangement as this plant was, and even if they all were, we still recognize the importance of keeping the auxiliary equipment in a first-class condition. Now, I want to discuss some of this equipment and the reasons and causes for giving it periodic and systematic attention.

All of our modern plants are equipped with centrifugal pumps for supplying the circulating raw water to the coolers, as well as using centrifugal pumps for the circulating of the soft water for piston, liner, or jacket cooling. A centrifugal pump is a mighty fine piece of apparatus, not only because of the space being small, which it requires for installation, but because it performs such an enormous amount of work for its size, and can be conveniently inspected as well as connected up without a great deal of effort and equipment, which was necessary in the old steamers or pumping equipment of a few decades ago.

When pumping equipment is required, the plant designer furnishes the pump manufacturer with all the data necessary, relative to capacity or amount of water desired, head and suction lift, etc. The pump manufacturer then quotes on a pump covering the desired characteristics and before shipping the pump, it is given a thorough shop test, a capacity and head rating, and is tested for mechanical perfection. When the pump is received and installed, the manufacturer clearly specifies how it is to be aligned and maintained in order to meet the guarantees as to performance. If these instructions are carried out to the letter, you have eliminated one of the chief causes of faulty pump operation.

In order to continue operating at the guaranteed performance, the pump must have periodical attention. Wearing of the impeller vanes or wearing rings to any great degree will immediately cut down its efficiency. Often the impeller or small openings between vanes, becomes clogged with foreign material. If the raw water supply is taken from a lake or river, much of this material is drawn in through the suction line. If you are fortunate enough to have ample condensate water or good filter protection, this phase may be eliminated.

Another item which has varying effects upon a centrifugal pump is the type of water pumped. Most raw waters differ in chemical analysis, some being acidulous, some containing salt solutions, while others are more or less free from these characteristics. If you are using water of this type, the manufacturer should be notified, as he can then build your

. . . . *And now please turn to page 58* . . . .

* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*

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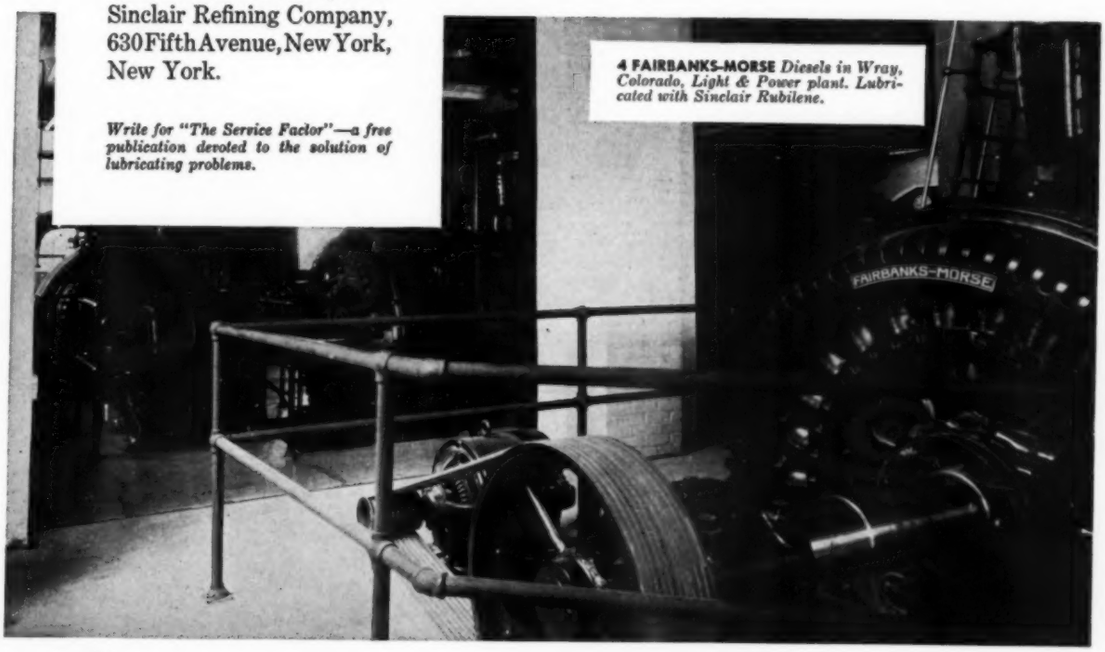

4 FAIRBANKS-MORSE *Diesels in Wray, Colorado, Light & Power plant. Lubricated with Sinclair Rubilene.*

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Supervising and Operating Engineers' Section

. . . . *Continued from page 56* . . . .

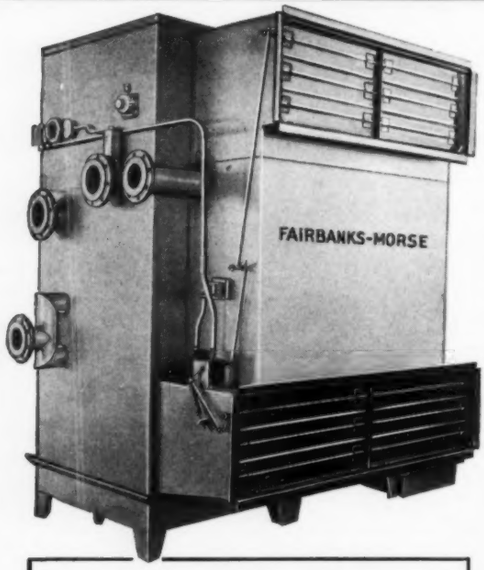
pump with corrosive resisting materials which will not be harmed to any great extent by this type of water. All water contains a certain amount of air or gases in their natural state. The amount of these in a particular water have corrosive effects upon the impeller and wearing rings. It is always a good idea to equip your pumps with vents, which may be opened occasionally by the operators to relieve any accumulation in the casing. Attention should be paid especially to the suction lines. The lift should be all on an upgrade, with no high spots in the suction line. If these are left, the air and gases accumulate at this high point and when enough of it has accumulated, you may have a slug pass into the pump and lose your suction. I recall a case where the raw water supply was taken from a cistern or well about 100 ft. from the plant. The pump had been operating satisfactorily for several years, when it suddenly developed periods of losing its prime. The cover was removed, impeller and wearing rings inspected and found satisfactory. New packing was installed in the glands yet it still gave trouble. About once in twenty-four hours it would lose its prime. We then dug up the suction line and about fifty feet from the building we found a place where a large stone was pressing upward on the under side of the line, due to frost action. This formed a high spot in the suction line at this point. The stone was removed and the trouble ended. The wearing rings are a most important item. They are placed in the casing on the impeller, on the inlet side, to reduce leakage back from the high pressure side of the suction side. The clearances provided by the manufacturer are small. A little wear, therefore, at this point immediately affects pump efficiency.

Most pumps are equipped with bronze shaft sleeves, so that the gland packing will wear on the sleeves rather than on the shaft proper. Excessive wear on these sleeves results in excessive leakage at the gland. These should be examined periodically. Another item to be watched is the waterseal ring, which is provided for a dual purpose of providing a seal and also lubricate the sleeves. These often become plugged with rust and material gathered from the packing and should be inspected and kept clean. For successful pump operation, a tiny drip of water should at all times appear at the packing gland. This for cooling of the sleeve and shaft. This drip should be piped to a sewer or sump and not allowed to run out over the floor as in the aforementioned plant.

Oil in both pump and motor bearings should be changed periodically, after cleaning the oil wells out. If your pump is equipped with roller or ball bearings, watch the greasing of these bearings. Do not cram the housings full, since this tends to heat up the bearings. Give the grease and bearings plenty of room to work around freely.

Last, but not least, use a good grade of pump packing. If you are not sure or have excessive sleeve wear at the point of contact with the packing, consult the pump manufacturer, for he knows what will work best. Many manufacturers use nitroloy or some high grade of hard material for pump sleeves in case of high-speed pumps. This is a little more expensive but the wear is reduced proportionately and pays in the long run. Keep your pumps clean and painted, free from dirt, rust and corrosion. It pays good dividends in the long run. Further accessories, their installation and upkeep will be discussed next month.

Here's the Modern Way to Cool Jacket Water



FAIRBANKS-MORSE EVAPORATIVE COOLER

Type C, with full thermostatic control. Lube oil temperature is controlled independently of jacket water temperature. Other types provide for semi-automatic and for manual control.

● The new Fairbanks-Morse Evaporative Cooler, operating on a closed system, provides the *modern* way to cool jacket water.

This new Cooler takes little space — can be located in the engine room, right under the engineer's eyes. It operates efficiently . . . eliminates all possibility of freeze-ups . . . requires practically no maintenance. It *saves fuel* by keeping jacket water and lubricating oil *always* at the same, ideal temperature. And by circulating *clean, soft water*, it keeps jacket passages free from scale and dirt. That means lastingly efficient cooling and the resultant freedom from engine maintenance and repair work.

Where the F-M Evaporative Cooler replaces a heat exchanger using raw water, it effects a considerable saving in water and pumping costs. Yet despite all these advantages, it costs less than others to buy and to install.

Would you like the complete story? You'll find it in Bulletin FECD-2, which includes dimension drawings, piping diagrams, capacity tables, etc. To get a copy, write Fairbanks, Morse & Co., Dept. C-134, 600 S. Michigan Ave., Chicago.

FAIRBANKS-MORSE & CO.

Air Conditioning Division Chicago

Dave Buttles Promoted to Important Position

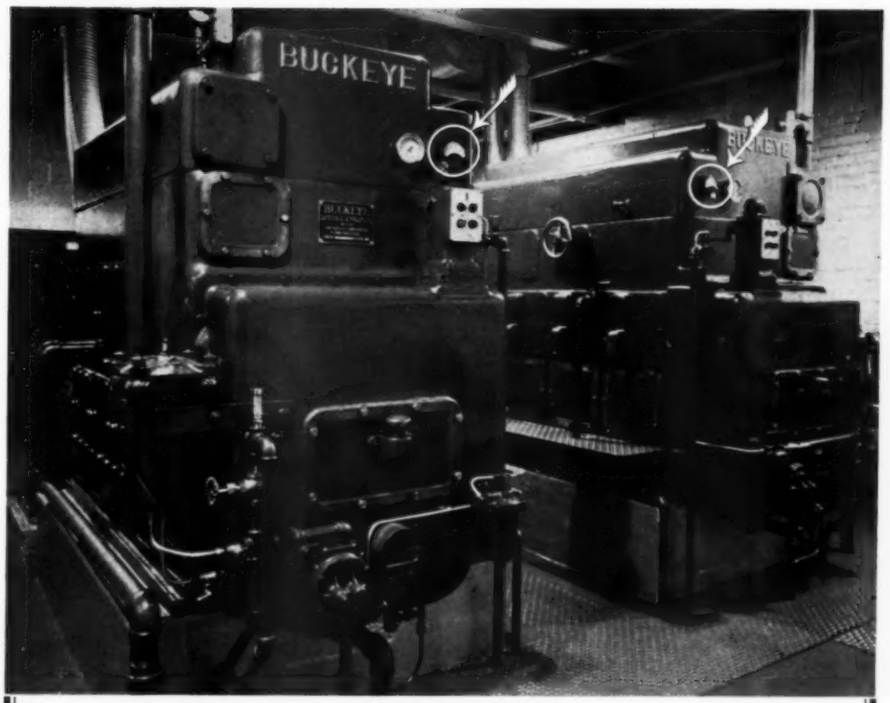
MR. P. E. Letsinger, Vice President In Charge of Sales, Cummins Engine Company, announces the appointment of D. J. Buttles as Western Manager with offices in the newly-established, direct factory branch at Salt Lake City, supervising territory including eleven western states, British Columbia, Alaska, and Hawaii.

Under Mr. Buttles' management are three sales regions. In each of these is a sales representative. R. H. Wills is in charge of the North-west Region; Tom Collins, the Southwest Region; and it is understood that a new man will be selected to cover the third region. The new man to be selected will make his office either at the branch in Salt Lake City, or the sub-branch in Denver. No announcement has yet been made of the local manager for Salt Lake City or Denver.

With the Cummins factory now on a 24-hour, 7-day a week schedule, engine production has been stepped up nearly three times. This entire engine volume is going directly to prime defense uses. The increased tempo of these times forbids any long-distance contacts and the Cummins Engine Company feels that Mr. Buttles and the Salt Lake City branch will prove a big help in maintaining a closer factory-owner understanding.

Dave J. Buttles

The hundreds of friend Dave Buttles has made among manufacturers of industrial equipment and users of Cummins Diesel engines throughout this territory will welcome his appointment to this important post.



The Times Publishing Company of Pawtucket, Rhode Island, installed these two 150 hp. Buckeye Diesel generating sets as assurance of low cost, dependable power both in normal times and in emergencies. Alnor pyrometers, seen above, give extra assurance that these engines perform their task well. (See article in this issue)

"THE NEWSPAPER MUST GO TO PRESS"

Power failures of days' duration resulting from the hurricane of 1938 are not forgotten by far-sighted New Englanders. And now the war imposes both additional production pressure and potential hazards on news publishing plants. So the Pawtucket Times has provided dependable power to carry on an uninterrupted flow of news. Everywhere that Diesels are so utterly relied upon, you will find Alnor in the first line of defense against inefficient performance and costly shutdowns.

●

Buy or specify "Alnor"
Ask for catalog

Illinois Testing Laboratories Inc.
Don't Guess Know!
423 NORTH LaSALLE STREET, CHICAGO, ILLINOIS
Manufacturers of "Alnor" and Price Instruments—Products of 41 Years' Experience

Minnkota Power Cooperative

. . . . *Continued from page 51* . . . .

cable and an overhead span of wire are used for the interconnection. In normal operation no real power is transferred unless it is desired by either the Mill or the Cooperative. The normal reactive current flow throughout the day, however, runs from 200 to 300 amperes which does much to improve the plant power factor of both stations.

The building in which this generating plant is housed has been built to provide facilities for not only the management of the Minnkota but also for one of the distribution cooperatives which it serves. The overall length of the building is 340 feet which is 80 feet wide in its widest portion. Provided in the building is a spacious lobby, a large glass enclosed display window surrounding the main entrance, an auditorium, a kitchen and pantry, a large fireproof warehouse, a ten stall car garage, vault, locker room, meter testing room, public toilets and seven work and private offices, all of which go in to make this one of the finest structures of its kind in the world.

The layout, design and engineering work was done by the firm of Ellerbe and Company of St. Paul, Minnesota. Construction was done by means of force account with Mr. C. F. Lewis of Bedford, Indiana, as Construction Superintendent in charge of all construction and installation work. Mr. Franklin P. Wood, Chief of the Generation and Transmission Section, represented the Rural Electrification Administration which financed the structure.

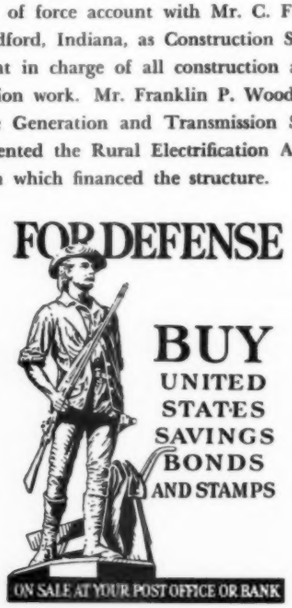
The three Worthington engines shown here were installed about a year ago in the Municipal Power Plant at Casey, Illinois. All are equipped with Manzel Model 94 Force Feed Lubricators. The plant furnishes power for city residential and commercial use and also for a large shoe factory. The present load is about 5,000 k.w.h. The total cost of the new plant, $115,000, is being paid out of earnings.

The efficient lubrication afforded by the Manzel Model 94 is an important factor in the highly satisfactory operation of the Casey plant. Manzels use less oil because their feed is capable of very fine adjustment. Once set, they deliver an accurately measured amount of oil with each plunger stroke.

Manzel's exclusive oil-sealed pumping plungers insure positive lubrication at all times, since they prevent air being drawn into the line regardless of the oil level in the reservoir. All parts are of sturdy construction and sight glasses are tested for 1500 lb. pressure. After regulation Manzels require no attention except to maintain the oil supply in the reservoir.

For complete information on modern automatic lubrication, ask for Catalog 94-B.

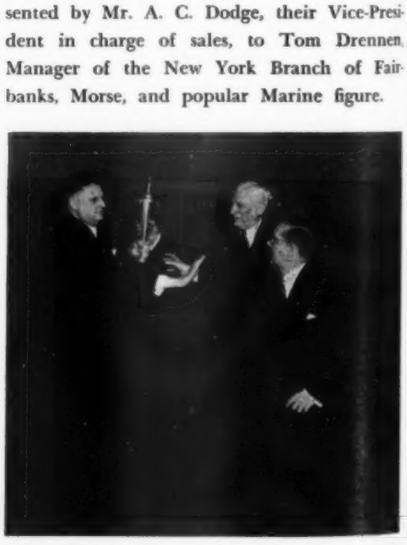
MANZEL BROTHERS CO.
275-277 BABCOCK ST. BUFFALO, N.Y.



Tom Drennen's New York Branch Captures The Fairbanks, Morse President's Cup The Fourth Time

TOM DRENNEN did it again!

For the fourth time in nine years the Fairbanks, Morse President's Cup, a handsome silver trophy dedicated by Colonel Robert H. Morse to the branch securing the greatest percentage of quota during the year, was presented by Mr. A. C. Dodge, their Vice-President in charge of sales, to Tom Drennen, Manager of the New York Branch of Fairbanks, Morse, and popular Marine figure.



Tom Drennen throws a stiff arm at Bob Morse, Jr., Manager of the F-M Boston office, who attempts to grab the President's Cup as it is being presented by A. C. Dodge, Vice-President in Charge of Sales.

Tom's multitude of friends in the marine field join with others in congratulating the Num-

ber One man of the New York Branch as, for the second successive year and the fourth time in all, he took the President's Cup in a hard fought battle.

One of the interesting aspects of this year's race was the friendly battle between Tom Drennen and Bob Moore, Jr., Manager of the Boston Office, the latter holding the lead until the closing weeks of the contest when a superlative effort by the New Yorkers kept the President's Cup safely at 80 Broad Street for another year.

Though the committee in charge of this year's race has adjusted the quotas to a point where New York has been increased 38%, winning the cup three consecutive times means permanent possession, and Tom says it's in New York to stay.

Over 110 guests attended the Victory Luncheon which was held Saturday, January 24, at the Downtown Athletic Club, New York City. The representatives from the Company's headquarters in Chicago who were present were Arthur C. Dodge, Vice-President in Charge of Sales, Wesley B. Moore, Manager General Diesel Sales, Henry J. Barbour, Manager Sales Promotion, Thomas MacMillan, Director, as well as R. H. Morse, Jr., Manager of the Boston Branch of Fairbanks, Morse, who took second place in the President's Cup contest this year, Charles Bradeen, Vice-President of Canadian Fairbanks, Morse & Co., Ltd., Arthur L. Decker, Vice-President of Henri, Hurst & MacDonald, Inc., the Company's advertising counsel, and editors of the national marine and Diesel trade publications.

The Sharples Corporation Appoints Miss Joann B. Sharples

THE Sharples Corporation has announced the appointment of Miss Joann B. Sharples as Advertising Director, to whose attention all matters pertaining to advertising should be directed.

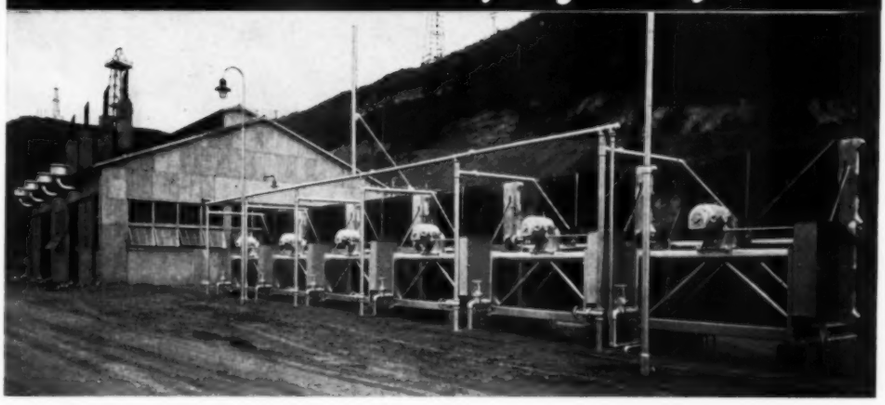
The Oswald Advertising Agency, Philadelphia, W. D. Lindsey, contact executive, will continue to function as advertising counsellors.

Steam Tug *James F. Dwyer* To Be Converted to Diesel

AN Atlas Imperial, four cycle, direct reversible Diesel engine and auxiliary equipment has been contracted for by the Harbor Towboat Co., Inc., a subsidiary of the Dwyer Lighterage, Inc., to convert the steam tug *James F. Dwyer* to Diesel. The main engine selected is a six cylinder unit with 13 in. bore and 16 in. stroke, rated to develop 400 hp. at 300 rpm. A Kingsbury thrust bearing forms an integral part of the engine, as do also the double acting piston type circulating water pump and the plunger type bilge pump.

A built-in, single stage air compressor is incorporated to replenish the starting air. A single lever enables the operator to maneuver and control the speed of the engine. This single lever also controls automatically an air operated flywheel brake that stops the engine and thus permits of instantaneous maneuvering. The *James F. Dwyer* has a wooden hull built at Tottenville, Staten Island, N. Y., in 1904, and is 69.7 ft. long, 20.7 ft. beam, and 9.0 ft. deep. Mr. M. G. Kindlund of Kindlund & Drake, Naval Architects, has been retained to direct the conversion work which will be performed by the R. Lenahan Company at Kingston, N. Y. The tug will be used on the New York State Barge Canal System, hauling petroleum products in bulk.

RINCON FIELD ENGINES COOLED *by Young*



The installation of YOUNG Jacket Water Coolers at Rincon Field, Ventura, California (above) is another example of the ability of YOUNG-engineered cooling units to fill ALL the unusual requirements of a job and, at the same time, cut power costs 50% and more.

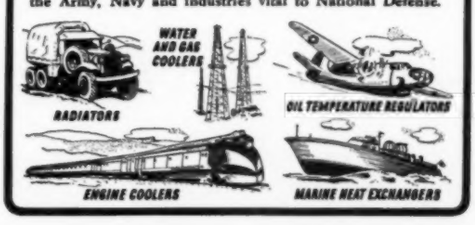
Six YOUNG units, each a separate and complete circulating system, cool four 600 HP Diesel-convertible engines operating at 400 RPM on gas and direct connected to 400-KW generators. Eighty-three inch propeller fans in the YOUNG units are directly driven by 15 HP, 2-speed gear motors. Of unusual interest are the thermostatic controls which switch the motors on and off, and from No. 2 to No. 1 speeds with every change of 4 in the temperature of the jacket water.

YOUNG Engine Jacket Water Coolers are made for Diesels from 40 to 600 HP. But they are only one of nine types of YOUNG cooling units for gas, gasoline and diesel engines. YOUNG engineers can give you the type and size of cooling unit best adapted to your installation. Consult them.

YOUNG RADIATOR CO.
Dept. 232-C, Racine, Wis.

YOUNG AND THE VICTORY PROGRAM

In addition to heating and air conditioning units for defense plants, military cantonments, etc. the Young Radiator Company manufactures more than 100 heat transfer products for the Army, Navy and industries vital to National Defense.



YOUNG ENGINE JACKET COOLERS
Designed for maximum cooling capacity with minimum power consumption. Eighteen different sizes.

Young HEAT TRANSFER PRODUCTS
OIL COOLERS · GAS, GASOLINE, DIESEL ENGINE COOLING RADIATORS · INTERCOOLERS · HEAT EXCHANGERS · ENGINE JACKET WATER COOLERS · UNIT HEATERS · CONVECTORS · CONDENSORS · EVAPORATORS · AIR CONDITIONING UNITS · HEATING COILS · COOLING COILS

Young ENGINEERING AND MANUFACTURING SERVICE
SPECIALISTS IN HEAT TRANSFER PRODUCTS

Pawtucket Times Diesels

. . . . *Continued from page 42* . . . .

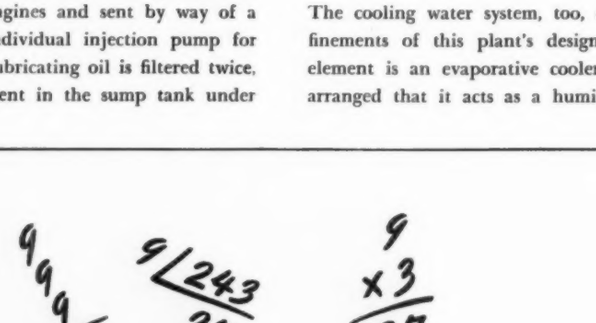
gear pump. The operator is relieved even of the simple task of filling the day tank for the transfer pump is controlled automatically by a float in the tank. Both storage and day tanks have level gauges. Fuel is taken from the day tank through a filter by the supply pumps built into the engines and sent by way of a header to the individual injection pump for each cylinder. Lubricating oil is filtered twice, once by an element in the sump tank under the floor at the end of each engine and once by a cartridge-type filter on the discharge side of each unit's main circulating pump.

Each engine also has a shell-and-tube oil cooler in its lubricating circuit. Thus, clean oil at proper temperature is supplied under pressure to all parts of the Diesel.

The cooling water system, too, shows the refinements of this plant's design. The main element is an evaporative cooler which is so arranged that it acts as a humidifier for the paper storage rooms. Jacket water is circulated through each Diesel and the coils of the evaporative cooler by a centrifugal pump V-belted to the generator shaft. Even the starting air compressor shows evidence of thoughtful planning. The air storage tank is placed so that air can be used in the adjoining garage, as well as in the engine room. To assure an adequate supply of air whenever it is needed, the motor which drives the compressor through V-belts is controlled automatically by the pressure in the storage tank. In case of need, the belts can be switched to permit operation of the compressor by a gasoline engine.

Severe tests have indicated that the Diesels are meeting the manufacturers' guarantee. The big presses are driven by slip-ring motors which throw no sudden load on the engines, but 45 kw. of the heating load is controlled by thermostat and comes on and off repeatedly and without warning. The Diesels proved they could handle this trip-hammer load with ease. The tests were conducted primarily to determine the capacity rather than the economy of the plant and yet returns for fuel were found to run as high as 11.9 kw. hrs. per gallon. There is every evidence that the Pawtucket Times has installed a two-engine insurance policy guaranteeing that there will be continuous power to keep the presses rolling.

The Diesels, we have noted, are Buckeye; the generators, voltage regulators, switchboard and automatic synchronizers Electric Machinery. Both intake and exhaust silencers are Burgess Snubbers, the air filters Air-Maze, the Vibro-Isolators are Korfund, and the flexible hose Atlantic. The governors are Woodward, fuel injection American Bosch, the fuel Socony-Vacuum, the fuel tank level gauges Rochester and Petrometer, the fuel filter Purolator. The lubricating oil is Texaco Ursa, the lube filter Nugent. The evaporative cooler is Buffalo, the cooling water pumps Goulds, the exhaust pyrometers Alnor, the pressure gauges Marsh, the thermometers Ashcroft and U. S. Gauge. The Silent Watchman is a patented Buckeye device, the starting air compressor is a Curtis with a Lima motor and gasoline engine.



The ANSWER is the same

A MANUFACTURER wants to know how to improve his product—how to make it more nearly perfect in service.

A SALES MANAGER wants to know what the factory can give him in new talking points—features and advantages to offset competitive appeals.

And the CUSTOMER not only wants the most service satisfaction his dollar will buy but he's alert enough to figure out where and how to get it.

★ ★ ★

In the manufacture, sale and use of internal combustion engines of all types—gasoline or Diesel—the VISCO-METER* goes a long way in answering for all three.

Engineers agree that constant and correct lubrication is the most important single factor in engine performance...but how to control it has been the problem.

The VISCO-METER* is the only dependable means of constantly showing the viscosity (lubricating ability) of the oil when the engine is in operation...a visible, warning safeguard against lubrication failure of the crankcase oil.

Those manufacturers who have made the VISCO-METER* part of their equipment will testify to its many advantages in international service under varied conditions.

★ ★ ★

We know that the VISCO-METER* combines product-sales-customer advantages that are extremely important to every engine manufacturer. We would like to *show you why* at your plant. A VISCO-METER* engineer will answer your letter, wire or phone call.

VISCO-METER
CORPORATION GROTE ST., BUFFALO, N. Y.

**Fully covered by U. S. and Foreign Patents*

Briggs Clarifier Distributor Appointed

HENRY T. MOORE, northeastern zone manager for Briggs Clarifier Company, announces the appointment of William A. Da Lee, 4835 Woodward Ave., Detroit, Michigan, as distributor for Briggs Industrial Oil Clarifiers in the Detroit district.

THE Marine Iron and Shipbuilding Company of Duluth, Minn., has received an order from the United States Coast Guard for a 180 ft. cutter which will cost $857,000. This is the fourth building at the yard and she will be powered with a Cooper-Bessemer, Westinghouse Diesel-electric plant.

★ ★ ★

SPECIFICATIONS and plans for two 40 ft. Diesel tugs for the U. S. Army Engineers, Galveston District, have been prepared.

Youngstown Miller Opens New York Office

THE Youngstown Miller Company, manufacturers of oil purifying equipment, announces the opening of a New York Sales Office located at 55 West 42nd Street, with Reaves E. Strobel, district sales manager, in charge.

Changes in Caterpillar Personnel

ELEVATION of Harmon S. Eberhard to Vice-President of Caterpillar Tractor Co.; creation of a new Research Department headed by C. G. A. Rosen; promotion of G. E. Burks to Chief Engineer; J. R. Munro to General Factory Manager; and Charles A. Woodley to Factory Manager of the Tractor Division, have been announced by L. B. Neumiller, President of

Harmon S. Eberhard

the Company. The changes followed the sudden death, January 23, of Thomas John Connor, Vice-President.

Mr. Eberhard, who was named Chief Engineer in charge of all engineering activities of Caterpillar, in 1933, now has administrative direction of Research, Engineering, Manufacturing, Industrial Relations and Training.

A native of Stockton, California, birthplace of the track-type tractor, Mr. Eberhard entered the employ of The Holt Manufacturing Company there at the age of sixteen, serving as a draftsman in the engineering department. He enlisted as a private in the Corps of Engineers in World War I and was discharged with the rank of Sergeant after spending more than a year overseas.

Upon his return to Stockton, Mr. Eberhard was assigned to special development work for the U. S. Ordnance Department where two self-propelled track-type gun mounts were developed, contributing greatly to military progress, particularly in the direction of producing track-type machines suited for high-speed travel. From 1920 to 1925, he designed commercial products for the Holt Company. He transferred to the engineering staff of Caterpillar in San Leandro, California, in 1925, and became assistant General Chief Engineer in 1928 and Chief Engineer in charge of research in 1930. He came to Peoria and was made Chief Engineer in 1933. During the past year he has spent much time in

Steady, quiet power..

with MAXIM SILENCERS

Once again, Maxim equipment has been chosen for heavy duty work in New York harbor. On the two new sister tugs, "Hartford" and "Stamford," exhausts and intakes of the 805 HP F-M Diesels are silenced by Maxims.

On each tug a Maxim Spark Arrestor Silencer in the exhaust line reduces noise to a minimum and completely eliminates all sparks and embers. The intake "thump" is silenced by a Maxim intake silencer. This combination of silencing equipment helps make the "Hartford" and "Stamford" the quiet, safe tugs they are, and it will continue to keep them so throughout a long service life.

Engineering information on all Maxim silencing equipment is immediately available. Send details of your silencing problem for prompt assistance.

THE MAXIM SILENCER COMPANY

94 Homestead Ave. **Hartford, Conn.**

Washington, where his experience in the track-type tractor and Diesel engine fields has caused him to be called for frequent consultation.

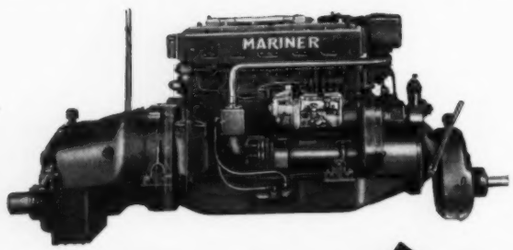
Newly appointed head of the Engineering Department is Mr. Burks, native of Montana. He attended University of Montana for one year, then moved to California where he acquired his early engineering experience, continuing his studies through extension courses of the University of California. His first experience in the design of heavy machinery was with the Schmeiser Mfg. Co. of Davis, California. In 1928, he joined the engineering staff of Western Harvester Co., then a Caterpillar subsidiary at Stockton, California, and a year later transferred to the Caterpillar engineering offices at San Leandro. From Chief Draftsman he was advanced, in 1933, to supervision of experimental and research engineering at that plant, coming to Peoria in 1938 as Assistant Chief Engineer in charge of engine design.

Separated from the engineering department now are research activities which Mr. Rosen heads in his position as Director of Research. Mr. Rosen is a native of San Francisco, California. He was graduated from the Cogswell Polytechnic College and from the University of California. During World War I, he served with the Naval Trial Board in the 12th Naval District. He became interested in Diesel engines during his college days and specialized in that field of study and work. He was connected with engineering staffs of several Diesel engine manufacturers and for six years maintained his own offices as consulting engineer. In 1928, Mr. Rosen became consultant to Caterpillar and the following year joined the company as engineer in charge of Diesel development, later becoming Assistant Chief Engineer in charge of Diesel research. He is the author of a book on "Marine Diesel Engines" and of many technical papers. Recognized as one of this country's leading Diesel engine authorities, and recognized by the Petroleum field as having made outstanding contributions to Diesel fuel and lubricants development, Mr. Rosen is a member of all the leading engineering societies. He is past vice-president of the Society of Automotive Engineers and holds an honorary life membership in the American Society of Marine Engineers.

C. G. A. Rosen

Mr. Munro, who takes over the top factory management job, was born within a few blocks of the company's California plant, where he started work as an apprentice at the age of 15. Completing his apprenticeship in 1922, he continued working in the tool room and was advanced to a foremanship in 1925. Two years later, he was placed in charge of metallurgy and heat treating and was sent to Peoria in 1931 to give special aid in the problems of

2 SURE WAYS TO GET HIGHER OPERATING ECONOMY



MACK MARINER 605 W FOR WORK BOATS, 100 sustained h.p., at 1500 R.P.M. Bore 4⅛". Stroke 6"—6 cylinders, Lanova combustion.

Take your pick of the two Mack Mariner Diesels shown here! *Conservatively rated* at 70 and 100 horsepower—on a continuous duty basis—these Mack Mariners have 4-cycle efficiency and Lanova controlled-combustion. Smooth-flowing, shockless, low running-cost power! Direct factory branch service at 28 tide-water and 14 fresh-water ports. Send a postcard today for complete information on a Mack Mariner for your boat.

Mack Manufacturing Corp., Marine Engine Div., Long Island City, N. Y.

MACK MARINER 457 W FOR WORK BOATS, 70 sustained h.p., at 1500 R.P.M. Bore 4¼". Stroke 5⅜"—6 cylinders, Lanova combustion.

MACK MARINE ENGINES ARE A PRODUCT OF THE BUILDERS OF WORLD-FAMED GASOLINE AND DIESEL-POWERED TRUCKS, BUSES AND FIRE APPARATUS

entering Diesel engine production. He became Assistant Superintendent of Engine and Tractor Assembly in 1933; Superintendent of Diesel Engine Assembly and Testing a year later and Factory Manager of the entire Tractor and Engine Divisions in 1936.

Mr. Woodley also got his start as an apprentice. Born in Pekin, Illinois, a few miles from the Peoria plant, he was accepted for apprentice training in 1926. He was graduated in 1930 and started work as a lathe operator in the machine shop, advancing through the inspection, tool room and planning departments to a foremanship in 1934, general foreman in 1937, and Supervisor of Industrial Engine Assembly in 1938. In 1941, he was made Assistant Factory Manager.

New Blackmer Bulletin of Engineering Pump Data

THE answers to many everyday questions concerning pumps, piping applications, viscosity of liquids, pipe friction, etc., are contained in a new bulletin just issued by the Blackmer Pump Company.

The new bulletin contains comprehensive tables of friction losses in pipes, covering viscosities to 2400 S.S.U., valves and fittings, viscostly conversion tables, tables of practical suction lifts, viscosity of various liquids at different temperatures and much other data frequently required by those who install pumps and make piping layouts. The unique value of this bulletin lies in the fact that it brings together in very accessible form a number of tables and liquid classifications which have seldom, if ever, been published in one piece of literature. For that reason, it will undoubtedly appeal to operating men who have neither the time nor the facilities for extensive research when they are called upon to make a pump or piping installation for the handling of unfamiliar liquids.

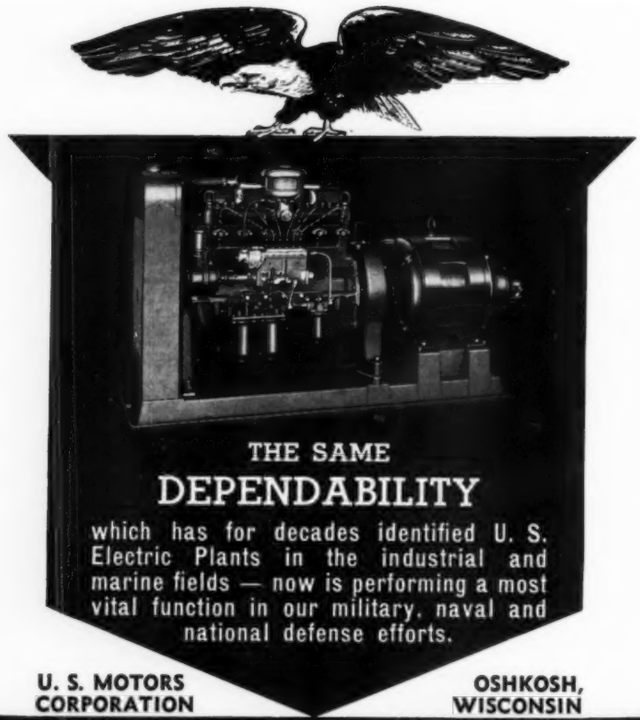
The new Blackmer publication is entitled "Bulletin No. 302, Engineering Pump Data." The size is 8½" x 11" and the margin is punched for binding in a standard three-ring binder. It will be mailed free to all persons interested in pumps. Address your request to Engineering Department, Blackmer Pump Company, Grand Rapids, Michigan.

Robert W. Mitchell Joins Honan-Crane Corporation

ROBERT W. MITCHELL who joined Honan-Crane on February 1 as Technical Engineer is well qualified in the problems of the use of oil in all fields. He comes to the Honan-Crane Corporation from the American Oil Company, Baltimore, with whom he has been connected since early in 1938.

Mr. Mitchell was born and reared in Washington, D. C., and comes from an Army family. He is a relative of the late Brig. Gen. William Mitchell of the Air Corps and his father is a

HILCO
OIL RECLAIMERS, AIRLINE OIL PURIFIERS
HYFLOW OIL FILTERS
HELP ASSURE
ICTORY
"OFFENSIVE" SHIPMENT
For the United Na . . .
they save oil and gines by
keeping them contin usly clean.
THE HILLIARD CORPORATION, 120 W. FOURTH ST., ELMIRA, N. Y.


THE SAME
DEPENDABILITY
which has for decades identified U. S. Electric Plants in the industrial and marine fields — now is performing a most vital function in our military, naval and national defense efforts.
U. S. MOTORS CORPORATION
OSHKOSH, WISCONSIN
U.S. DIESEL ELECTRIC PLANTS

Users of YM Oil Purifiers have

2 Great Advantages

1. They do not pay fancy prices for common earth marketed under trade names.
2. They can remove fuel dilution and all other contaminants. No other purifier built anywhere can do a better job.

CLEAN OIL — CLEAN ENGINES

★

YOUNGSTOWN MILLER CO., INC.
SANDUSKY, OHIO

retired Army Engineering Officer. Most of his schooling was received in Washington, D. C. including a specialized course in engineering. Following that, he was employed as a Civil Engineer in Montana in connection with water conservation for the Department of Interior. Later, and prior to his connection with the American Oil Company, he was Assistant Consulting Engineer working on equipment and power plant set-ups for Rural Electrification Administration in Washington. Mr. Mitchell's work with the American Oil Company has taken him into many fields of lubrication–including all types of stationary engines, turbines, mine equipment, and many kinds of industrial machinery.

The addition of Robert W. Mitchell to the staff of Honan-Crane will further strengthen their organization of Sales Engineers which is "Ready to work for you" on any oil problems that you may have.

New Bulletin On Superior Diesel

THE National Supply Company offers its new bulletin on the Superior "9 x 12" stationary Diesel to interested readers of DIESEL PROGRESS. This attractive and informative booklet carries concise descriptive text and many detailed illustrations of the "9 x 12" Diesel and its essential parts; also actual application photographs. Address request for Bulletin 138 to The National Supply Company, Superior Engine Division, Springfield, Ohio.

Edgar E. Huff Joins Maxim Silencer Company

THE Maxim Silencer Company announces the appointment of Edgar E. Huff, formerly Sales Manager of the Hill Diesel Engine Company, as Manager of their Mid-West Sales Office in Chicago. He succeeds William A. Damerel who has been transferred to the production department of the Company in Hartford, Conn.

Finding Right Flexible Coupling Easy with New L-R Selector Charts

ANYONE, without technical training, can easily and quickly find the right flexible shaft coupling, for his use, for light or heavy duty, the size, the bore, the exact coupling for his horsepower and rpm., the kind of load cushions for the conditions of operation, the price —everything he desires to know—with the aid of the new L-R Selector Charts supplied, without charge to the industry on request, by Lovejoy Flexible Coupling Co., 5001 West Lake St., Chicago, Illinois.

As an example of finding, suppose one wished to connect driving power of 140 hp., at 700 rpm., with a driven unit for greatly fluctuating loads requiring high protective resilience. The L-R Selector Chart on Type "H" shows almost instantly the coupling for this load.

Under bold heading "R.P.M." at the left of the table, the user of the chart runs his finger down to 700. That's the rpm. of the drive unit with which the coupling is to be used. At 700 follow the figures horizontally to the right to 140. That's the horsepower of the drive unit.

A glance at the top of this column shows the L-R Coupling for the purpose to be Type "H" 2865. The cushion material should be selected to accommodate the nature of the load—"LX" (Leather), applicable at any speed, for unidirectional load of a uniform nature, but not adapted for highly fluctuating or reversing loads.

Easily read data, right at hand, informs the chart user that the starting torque capacity is equivalent to 34.2 hp. at 100 rpm. and gives maximum bore measurements, weight, price, etc. The same finding method is used for all L-R Flexible Couplings.

These handy time-saving L-R Selector Charts are available, with the complete L-R Catalog, to any user of couplings on request addressed to Lovejoy Flexible Coupling Company.

Caterpillar Diesel Tractor Booklet

AN attractive 16-page booklet, Caterpillar Groundwork for Security, has just been published.

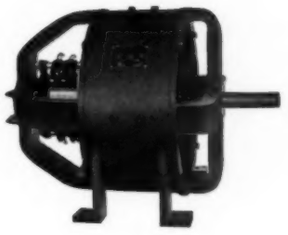
Aimed to show how and why Caterpillar Diesel tractors equip a farmer to weather the years and stay ahead—come what may—this publication combines illustrations of field work with pictures of product features. To receive this booklet request Form 7219 from Caterpillar Tractor Co., Peoria, Illinois.

★ ★ ★

THE Western Pipe & Steel Company of Los Angeles, California, has been awarded a negotiated contract by the Coast Guard for the construction of four arctic ice-breakers to cost $6,974,588 each. The Government will supply the machinery which will cost about $1,800,000 for each vessel. The dimensions of these ice-breakers will be 260 ft. length, 64 ft. beam, 28 ft. draft and they will have a displacement

COLUMBIA

A.C. and D.C. GENERATORS



Dependable performance is one of the chief advantages of Columbia A.C. and D.C. Generators. They are designed and widely used for light and power service and are ideal for use as ship auxiliaries. They are light in weight, compact and can be furnished in single bearing type for direct connection to engines.

Columbia D.C. Generators range in size from 7½ to 200 KW, 36, 60, 125 and 250 volts and in speeds of 1750, 1450, 1150 and 850 R.P.M.

A.C. Generators sizes range from 1 to 300 KVA. Speeds: 1800, 1200, 900, 720, 600, 514 and 450 R.P.M. Single or three phase; direct connected or belted exciters.

Both A.C. and D.C. Columbia Generators are available for prompt shipment.

COLUMBIA ELECTRIC MFG. COMPANY
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Hydraulic Drives
SPEED UP PRODUCTION
IN THE OIL FIELDS . . . the flexibility of rigs equipped with Twin Disc Torque Converters is speeding up drilling operations because engine power is automatically adjusted to the load which eliminates gear shifting. Small, high-speed engines can be used where normally larger, slow-speed engines might be required . . . heavy loads are picked up at slow speeds. You can't stall the engine.
IN THE LOGGING CAMPS . . . in hauling in logs with a yarder, you have only one control—the engine throttle . . . line speeds are faster because the Torque Converter's automatic adjustment of speed to load permits the maximum speed with no chance of stalling the engine . . . no time is lost taking up slack line.
The complete story is covered in Bulletin 132. Ask for it. TWIN DISC CLUTCH COMPANY, 1345 Racine Street, Racine, Wisconsin.
UPPER LEFT: Twin Disc Hydraulic Power Take-off.
LOWER LEFT: Twin Disc Torque Converter.
TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

FLEXIBLE EXHAUST HOSE

ATLANTIC Seamless Welded Steel Hose for DIESEL ENGINE EXHAUST

HIGHLY recommended for diesel exhaust and air intake by leading diesel engine manufacturers, Naval Architects and Engineers.

Cannot leak or burn out; has no interlocking joints to loosen; no packing to rely on for tightness; eliminates vibration; furnished in sizes from 1" to 36" I.D. inclusive; supplied with forged steel flanges or nipples in length desired, straight or bent to blue-print specifications.

In service in Industrial Plants, U. S. Navy, Railroads, Marine, etc.

For complete information, write for Bulletin No. 10-B.

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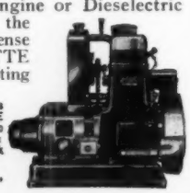
Defense comes first and we are all out for Victory. We thank customers who have suffered delays in the delivery of their WITTE Diesel Engine or Dieselectric Plant for giving the right-of-way to defense orders. "A WITTE Diesel is worth waiting for."



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• LARGEST BUILDER OF SMALL DIESELS •

ESSENTIAL *Vitamin* **D EPENDABILITY**

THE VITAL INGREDIENT BUILT INTO *TUTHILL INDUSTRIAL PUMPS*

For uninterrupted production, there is no substitute for pump dependability. Tuthill internal-gear positive displacement rotary pumps are known everywhere for their dependable performance. Precision-built and job-engineered, they are serving industry on production tools as well as on the implements produced.

Assure production without interruption by specifying Tuthill pumps for coolant, lubrication, hydraulic, fuel booster and non-corrosive liquid transfer service. Capacities from 1 to 200 g.p.m., pressures up to 350 p.s.i.

Write for complete catalog

TUTHILL PUMPS

TUTHILL PUMP CO., 933 E. 95th St., Chicago, Ill.

of 5,000 tons. The contract in the amount of about $6,000,000 to furnish the propelling machinery for these arctic ice breakers has been awarded to Fairbanks, Morse & Co., Beloit, Wisconsin. Each ice breaker will have a power plant of six main Diesel-electric generating sets which will provide power for three main motors, developing a total of approximately 10,000 shaft horsepower to drive three propellers, one forward and two aft.

Ice-worthiness will be the prime requisite of these vessels as compared to seaworthiness and they will be constructed to withstand severe arctic ice conditions. They will be capable, however, of good performance in open water in accordance with normal standards for this type of ship and will have a cruising radius at full power in open water of about 11,000 miles. Space for the storage of an airplane to be used to coordinate ice-breaking operations will be reserved on the main deck of each vessel. Accommodations for eighteen commissioned officers and 250 enlisted men will be provided aboard each vessel. They will be named *Northwind, Eastwind, Southwind* and *Westwind.*

Henry H. Howard To War Department

MR. Henry H. Howard, Manager of the Engine Sales Division of Caterpillar Tractor Co., has been called to Washington to take up temporary war-time duties in the War Department, according to an announcement made by President Louis Neumiller today.

Mr. Howard has been loaned to the Ordnance Department at their request to serve as consultant to Colonel J. K. Christmas of the Tank and Combat Vehicle Division.

A graduate of the University of California, Mr. Howard entered Caterpillar's employ early in 1926, working first in the Parts Department, and later in the Export Offices of the Company's San Leandro, California, plant.

In July of 1928, Mr. Howard was sent to Australia to serve as Export Representative in that country. Returning three years later, he was assigned for a time to duties in the Domestic Sales Department, advancing to Manager of Governmental Sales in 1935. In 1937 he was given responsibility for engine sales, in the position he has since occupied.

NAYLOR EXHAUST and INTAKE PIPE

Cushions

VIBRATION

IN DIESEL SERVICE

Naylor is the one light-weight pipe with the structure required for diesel exhaust and intake pipe service. Its exclusive Lockseam Spiralweld gives you leak-tight pipe that absorbs vibration, shock loads, expansion and contraction—and combines these advantages with strength, safety and the economy of light weight. Sizes from 4" to 30" in diameter with all types of fittings and connections and complete fabrication service.

Write for Naylor Catalog or send specifications for quotation.

NAYLOR PIPE COMPANY
1265 EAST 92nd STREET • CHICAGO, ILLINOIS

1 to 1000

K.W. —D. C. Generators to 1000 K.W. for Engine, Direct or Belt Drive; Single or Two Bearing Type; Solid or Flexible Coupling.

A.C. Synchronous Generators to 1500 K.W.

H.P. —D. C. or A. C. Motors and Polyphase Induction Motors to 1000 H. P. to meet any special requirements.

Write for Burke recommendations.

BURKE ELECTRIC CO • ERIE, PA.
SINCE 1891

Mr. Howard's position at Caterpillar will not be considered vacated, Mr. Neumiller stated,

Henry H. Howard

but his duties and responsibilities will be assigned for the period of his absence to Mr. Horace W. Smith, Assistant Manager of the Division.

★ ★ ★

THE U. S. Coast Guard, Washington, D. C., has placed an order with the Dubuque Boat & Boiler Works, Dubuque, Iowa, for the construction of a new cutter of the tender class at a cost of $153,655, machinery to be supplied by the Government. The dimensions of this new tender will be 100 ft. in length, 24 ft. beam, 4 ft. deep, with a displacement of 165 tons, and is to be named "Cosmos." The main propelling machinery will be Diesels, driving twin-screws, and developing 330 shp.

Diesel Pipeline Engine Booklet

"CATERPILLAR Power for Pipeline Pumping" is the name of a new eight-page booklet just off the press.

This freely illustrated booklet bears out its title with action pictures of various Caterpillar Diesel engine installations to accompany the text. If interested, request Form 7279 from Caterpillar Tractor Co., Peoria, Illinois.

West Coast News

FOUR Fairbanks-Morse Diesels, two 300 hp. and two 360 hp., are being installed in the Hughes Aircraft Company's plant in Culver City, California. A 132 hp. F-M gasoline engine will be used for standby service. Operation is full automatic.

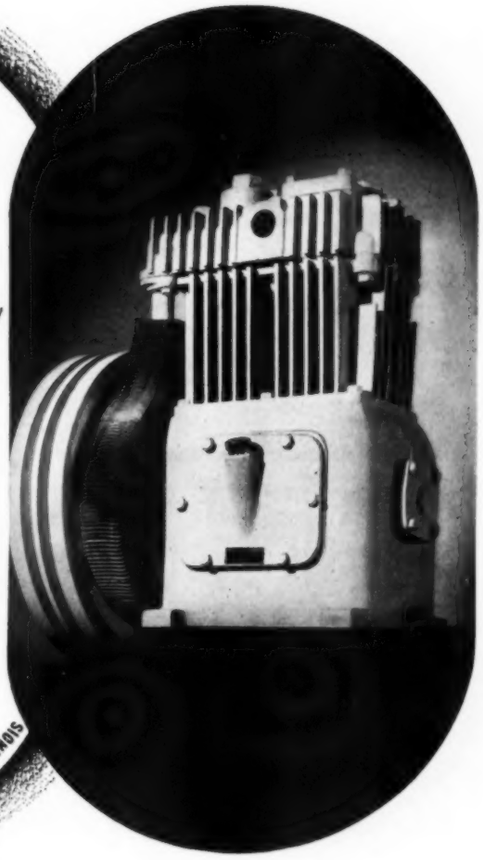
MODERN DESIGN

—index to Quincy's greater over-all efficiency

Construction is simpler. Radiation area is increased 12%. Lubrication is more thorough—more positive. Quincy Compressors have proved their dependability for starting and other services on hundreds of Diesel installations on land and sea. For services requiring intermittent pressures up to 500 lbs. per sq. inch. Make your next Diesel installation neater, more modern-looking, by specifying Quincy Compressors.

Quincy COMPRESSORS

QUINCY COMPRESSOR CO., 422 MAIN ST., QUINCY, ILLINOIS



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STATIONARY—MARINE

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750 to 6500 H. P

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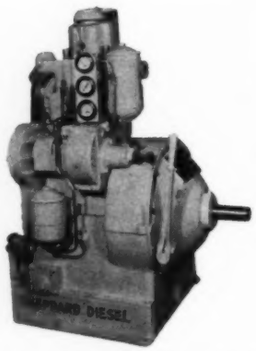
DIESEL MARINE AUXILIARY UNITS

SHEPPARD Model 7, single cylinder full Diesel conservatively rated 8 hp. at 1200 r.p.m.



The SHEPPARD full Diesel engine, of all American design and manufacture, is supplied for marine auxiliary service as a complete unit with all necessary accessories and arranged for driving generator, pump and compressor.

Write for full particulars.

R. H. SHEPPARD COMPANY • HANOVER, PENNSYLVANIA

SIMS OIL HEATERS

were specified along with other high-grade equipment for the REA Minnkota Power Plant, and are now contributing an important part in heating oil from the unloading stage to the final purification system of this modern power plant.

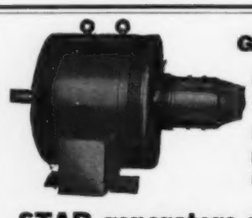
THE SIMS CO.
ERIE, PA.

TWO Wilmington Transportation Company's tugs, *Captain William* and *Jimmie K*, have been repowered with larger Fairbanks-Morse Diesels: a 5 cylinder, 410 hp. at 327 rpm. engine replacing a 300 hp. F-M and a 6 cylinder 240 hp. at 400 rpm. replacing a 200 hp. F-M unit in each tug respectively.

THE second of three 80-foot tuna boats is well under way at the Hodgson Ship yards, Long Beach, California. Like her predecessor, *Monarch* carries a Superior Diesel 330 hp. main engine and two 100 hp. auxiliaries. All engines are fresh water cooled.

TWO tugs under construction at Terminal Island, California, by Monty Ward for breakwater towing jobs will be powered with Washington Diesel main engines, and Superior Diesel auxiliaries. They will work in Los Angeles-Long Beach harbor.

SEA ANGLER, a 65-ft. sportfisher recently completed by the San Diego Marine Construction Co. for the Star and Crescent Boat Co., San Diego, California, is powered with twin 6 cylinder, 125 hp. Cummins Diesels, driving through Twin Disc gears.



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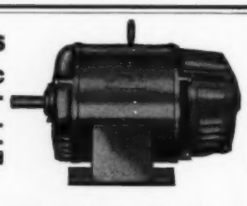
AC and DC
3 to 150 kw.
For Diesel and gasoline engine drive

MOTORS
AC and DC
¼ to 200 hp.
For all applications Stationary and Marine



STAR generators and motors are extensively used in both stationary and marine service. STAR gear motors are made in both planetary and worm gear types with and without integral brakes.

STAR ELECTRIC MOTOR CO. BLOOMFIELD, NEW JERSEY

CONSTRUCTION of the first of eight 205-ft. Navy tugs is progressing at the Alameda, California, plant of the United Engineering Co. Power will be four 950 hp. Diesel-electric units giving an estimated speed of 16.4 knots. Indian names will be used.

SEA WOLF, a 103-ft. tuna clipper, the first to be launched on San Francisco Bay for many years, is being taken south to San Diego, California, by her owner, Captain Frank Perry. The main engine is a 465 hp. Superior Diesel. Auxiliaries are two Superior 125 hp. Diesels. The 75 kw. generator is from Fairbanks-Morse. Kohlenberger ice machinery is installed.

THE Martinolich Shipbuilding Co., San Diego, California, has constructed the 135-ft. clipper, *Conte Grande*, for Andrew Castagnola. Her power is a 600 hp. direct reversible Enterprise Diesel. Her cargo will be sharp frozen using Kohlenberger refrigeration. All electrical equipment is by General Electric.

LORIMER Diesel engines are becoming increasingly popular with the Santa Barbara, California, fishing fleet. The latest to add a Lorimer to their market boat are Castagnola Bros., fresh fish dealers. Bob Castagnola is the *Piave's* skipper.

AMONG the Pacific Northwest craft recently taken over by the U. S. Army Quartermaster's Department is the 80-ft. former Washington State Fisheries patrol vessel *Governor Elisha P. Perry*, now the *Q-48*, and repowered with a 165 Gray marine Diesel.

THE 103-ft. tuna clipper *St. Ann*, under construction at the Martinolich Shipbuilding Co., San Diego, California, for Manuel Machado, is powered with a 6-cylinder 465 hp. at 600

CUTTING MORE TIME from DIESEL RECORDS!

DIESEL TIME SHEET
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SETTING OR TIMING any Diesel engine does not require tearing down coupling with

TYPE HQ
L-R Flexible Couplings

Either half of coupling rotates independently. Disconnection of machinery not necessary. Rugged sturdy coupling for shock, sustained or fluctuating loads, and especially designed for Diesels. CORRECTS ALL MISALIGNMENT. No lubrication required. Catalog and Selector Charts available.

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1. Silent Watchman (Patented).
2. Full pressure lubrication system.
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6. Individual pump for each cylinder
7. Completely enclosed

They insure long life, high efficiency, low maintenance—all meaning lower power costs. Write for catalogs on your letter-head.

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FUEL INJECTION EQUIPMENT
for installation by
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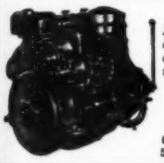

Gray Marine Diesels
Based on the Engine developed and built by General Motors, adapted and equipped for marine use by Gray.
1 to 6 cylinders, 25-165 H.P.
Both Rotations
Reduction Ratios to 4.4:1
Fresh water cooling is standard
GRAY MARINE MOTOR CO.
590 Canton Ave. Detroit, Mich.

OUR 80TH YEAR
PICKERING GOVERNOR CO.
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PRECISION BEARINGS
BALL • ROLLER • THRUST
for every load, speed and duty
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A modern lubricator for modern service on Diesel, gas, steam engines and compressors. Supplies dependable cylinder lubrication in metered quantities reducing friction and wear. Capacities: 2 to 24 pt. and 1 to 16 feeds. New catalog on request.

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LUBRICATOR DIVISION

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For Marine and Stationary Diesel Installations
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Protect your investment, avoid costly *shut-downs, with Penn Automatic Controls* for Diesel engines. Write for Bulletin E100.
PENN ELECTRIC SWITCH CO.
GOSHEN, IND.

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FOR TANK GAUGING EQUIPMENT FOR DAY TANKS & CLEAN OIL STORAGE
PETROMETER CORPORATION
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ORIGINATORS OF the famous TWIN TYPE STEELBESTOS
WE SPECIALIZE IN PRODUCTS FOR ORIGINAL EQUIPMENT
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INDUSTRIAL VALVES
For all types of heavy-duty Gas and Diesel Engines. Valves, Valve Seats and Guides furnished for every requirement. Ask for illustrated folder giving full details!
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WEST COAST PLANT • REDLANDS, CALIFORNIA

DIESEL ENGINES
AMERICAN LOCOMOTIVE CO.
DIESEL ENGINE DIVISION
AUBURN • NEW YORK

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WORLD'S LARGEST AND EXCLUSIVE MANUFACTURERS OF HYDRAULIC GOVERNORS FOR PRIME MOVERS
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SAFETY CONTROLS
ALARM SYSTEMS
TACHOMETERS
FOR DIESEL ENGINES
VIKING INSTRUMENTS, INC.
Stamford, Connecticut

rpm. direct reversible Superior Diesel, and two 6 cylinder, 130 hp. Diesels of the same make for auxiliaries. General Electric equipment is being used in this craft.

A 6 cylinder, 160 hp. Washington Diesel will be the main engine in the new 70-ft. tuna clipper *Sea Hawk*, built by the San Diego Marine Construction Co., San Diego, California, for The Coast Fishing Co. Baker ice machines will be used for refrigeration.

ATLAS Imperial Diesels are repowering two Pacific Northwest tugboats; a 200 hp. in the Bellingham Tug and Barge Co.'s *Barney J.*, and a 320 hp. in the Washington Tug and Barge Co.'s *Adolph J.* A 35 hp. Caterpillar Diesel was selected to repower the Pioneer Towing Co.'s *Resolute*.

THE 52-ft. halibut vessel, *Blance*, Captain Martin Stokke, Seattle, Washington, has been repowered with a 3 cylinder, 85 hp. at 500 rpm. gear type Cooper-Bessemer marine Diesel replacing the original heavy duty gasoline engine.

THE recently completed refrigerated fish tender *Ensenada*, by the Mexican interests headed by Gen. Abelardo L. Rodriguez, will handle frozen shrimp from plants at Topolobampo and Guaymas, Mexico, to Marine Products Co., distribution plant at San Diego, California. *Ensenada* is powered with Atlas Imperial Diesels as are the Mexican plants.

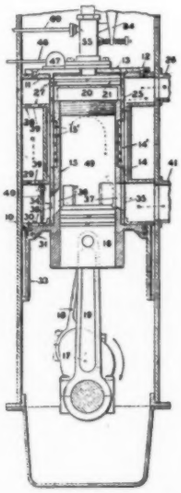
FALCON, largest purse seiner out of Southern California ports, formerly the 156-ft. Navy tug *Tadousac*, is being converted into a bait boat at the Hodgson yard, Long Beach, California. Recently she was repowered with a 910 hp. Superior Diesel, something of a record for a West Coast fish boat.

A GRAY Marine Diesel, 165 hp., has been selected by Dr. Charles Ward, Seattle, Washington, to power his new 50-ft. double cabin cruiser under construction by the Shain Manufacturing Co., of the same city.

ENTERPRISE, a 65-ft. all-welded steel tug built by the Pacific Coast Engineering Co., Alameda, California, for the San Francisco Towing Co., has a 400 hp., 6 cylinder Enterprise Diesel for propulsion and two Fairbanks-Morse Diesel auxiliaries.

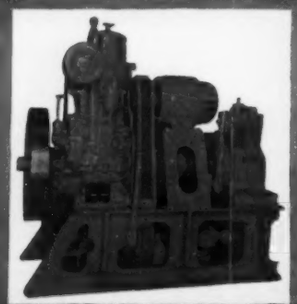
Patent 2,231,626

INTERNAL COMBUSTION ENGINE
Christian J. Hug, Highland, Ill.
Application January 14, 1939, Serial No. 250,862
8 Claims. (Cl. 123—50)

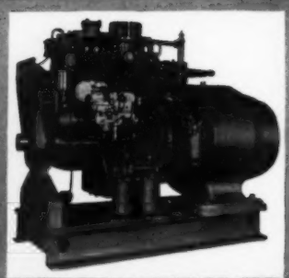


2. An internal combustion engine comprising cooperating piston and cylinder elements each of which reciprocates, a fuel injecting nozzle carried by and movable with one of said elements, a fuel injecting plunger actuated by the movement of said element, means for adjusting the stroke of said plunger, said means comprising an actuating element adjustable during operation of the engine, and means responsive to the engine speed in excess of a predetermined rate for automatically limiting the amount of fuel supplied to the engine.

REINER DIESEL *Marine Auxiliary Units*



- Marine auxiliary units 5 to 60 hp., 1 to 6 cylinder.
- With any generator—pump—compressor combination required.
- Generator sets 3 to 75 kw.
- *Special auxiliary units designed to individual requirements.*



JOHN REINER & CO., INC., *Long Island City, N. Y.*

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